Section One:
Task Force Vision, Goals, Findings and Recommendations

CHAPTER THREE: Task Force Findings

Through the course work of the Task Force and its three committees, hundreds of documents and information sources pertaining to transportation within Arizona and elsewhere have been collected, reviewed, presented, and discussed. This chapter summarizes some of the information and materials from some of those sources.

Transportation System Demands

Roads and Highways

The demands on Arizona's transportation system have grown and will continue to grow. Arizona's current transportation system cannot handle the projected population growth and increasing travel demand.

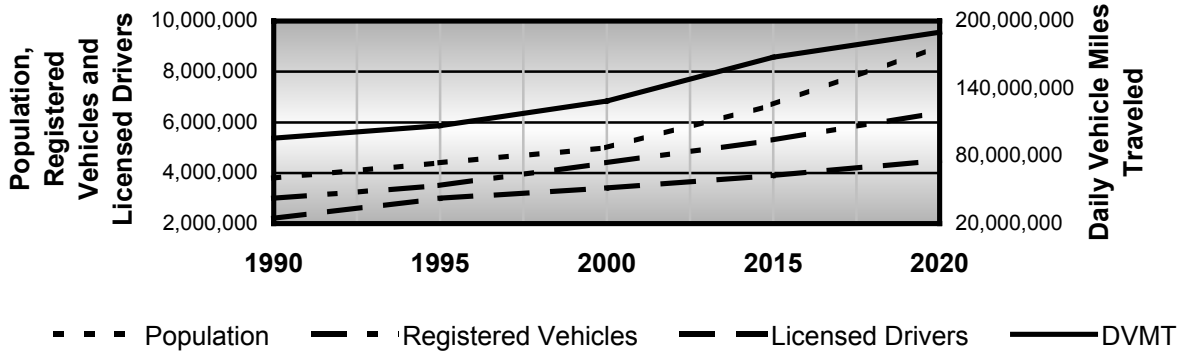
- The State of Arizona has experienced tremendous population growth and economic development over the past half century. The State has grown from 750,000 people in 1950 to over five million in 2000. Our state's population is expected to grow by 48% over the next 20 years. By 2020 Arizona's population is expected to exceed 7.4 million people.[1] Exhibit A illustrates the projected population growth of Arizona's counties, cities, and towns from 1990 through 2020.

- In 1975, there were 2.1 million people living in Arizona, 1.5 million registered vehicles, and 1 million licensed drivers. In 1985, Arizona's population had reached 3.3 million, there were 2.5 million registered vehicles, and 2 million licensed drivers. In 1996, Arizona's population had grown to 4.2 million people, there were 3.5 million registered vehicles, and 3 million licensed drivers. Today, there are an estimated 5.3 million people residing in our State, over 4.6 million registered cars, and 3.6 million licensed drivers. Based on these historical data, it is estimated that there will be 6.4 million vehicles registered in the State by 2020 and there will be over 5 million licensed drivers.[1, 2]

- Currently, the total vehicle miles traveled (VMT) per day in Arizona is approximately 129 million miles. Motorists in the metropolitan Phoenix area are driving approximately 60 million miles per weekday. This number is expected to grow to 95 million miles per weekday by 2020. In the metropolitan Tucson area, motorists are driving approximately 18 million miles per weekday. Daily VMT in the metropolitan Tucson area is expected to grow to 27 million miles per weekday by 2020. The following graph illustrates actual and projected growth in population, vehicle registrations, daily VMT and licensed drivers in Arizona from 1990 to 2020.

Figure 1-3-1

Projected Population and Vehicle Travel Growth



Source: Population Data: Arizona Department of Economic Security
DVMT Data: Arizona Department of Transportation, Booz-Allen analysis, 1998 Transportation Factbook, ADOT

Existing and future congestion on state and local roadways will hinder Arizona's economy and threaten the quality of life for our citizens and visitors.

- Congestion on our major state highways is increasing toward unacceptable levels of service. For example, average daily traffic (ADT) volumes along some sections of Interstate 10 between Phoenix and Tucson have increased dramatically in recent years and will reach unacceptable levels by 2006. Traffic volumes along this stretch of interstate are expected to double over the next 20 years.[6] Exhibit B illustrates the level of congestion that currently exists on Arizona's major highways**.**

- Congestion in the metropolitan Phoenix area will reach severe levels, especially during peak commuter hours, without additional investment in the system. In 1995, the average speed during the evening peak hours was 30 miles per hour. This will drop drastically to 16 miles per hour without significant transportation system improvements, which require an increase in funding. The slower average speed will result in a 1,000% increase in total hours of delay during the evening rush hour.[7] Exhibit C contains a map indicating the heavily congested intersections in the Phoenix metropolitan area.

- Within the metropolitan Tucson area, numerous major arterial streets have reached unacceptable congestion levels during the evening peak hours. The following are some of Tucson's most congested corridors:I-10, Houghton Road, Kolb Road, Campbell Avenue, Grant Road, River Road, Oracle Road, Ina Road/Sunrise Drive, Cortaro Road, and La Cholla Boulevard.[8] Exhibit D contains a map indicating the heavily congested intersections in the Tucson metropolitan area. Without additional investment, congestion in the area will reach catastrophic levels. Vehicle trips per day are expected to reach 3.6 million in 2020, compared to 2.1 million vehicle trips per day in 1995. Over the next 20 years, congested conditions are expected to exist on 70% of metropolitan Tucson's roadways.[8]

- A recent study by the Texas Transportation Institute (TTI) indicated that congestion in 68 metropolitan areas across the county in 1999 resulted in a $78 billion loss in job productivity, 4.5 billion hours of delay and 6.8 billion gallons of wasted fuel.[5]

- The TTI study found that on average motorists in the Phoenix area spent 31 hours idling in traffic in 1999 and the average Tucson area motorist spent up to 23 hours in 1999 in traffic delays. The study found that congestion in the Phoenix area cost $540 per capita when considering lost time and increased gas expense. The study found that congestion in the Tucson area cost $395 per capita.[5]

- In the TTI study, the Phoenix metropolitan area was ranked 31st in annual congestion costs per capita, even though this region was ranked as the 13th largest metropolitan area evaluated by the study.

- The TTI study found that areas with significant freeway expansion (e.g. the Maricopa Regional Freeway System) experienced slower growth in congestion than metropolitan regions that did not undertake substantial roadway expansion programs.

- Recent public opinion polls throughout the State indicate that growing traffic congestion is one of the major concerns for citizens and that finding ways to ease congestion and reduce travel time is a top priority. Input from the Task Force's statewide telephone survey, Modified Focus Groups, and the public Transportation Open Houses throughout the state reinforced the results from recent public opinion polls on transportation.

- A recent Tucson poll indicated that 40% of respondents indicated that increasing the ease and speed of travel is of foremost importance and 55% of the respondents stated that transportation is not adequately funded.

- A recent KAET poll indicated that 67% of Arizona residents believe that congestion is a serious problem that needs to be reduced.

- Traffic congestion is a growing problem throughout Arizona. Exhibit E lists congested intersections in the state that should be improved with existing and future transportation revenues.[3]

- Even without the full implementation of the North American Free Trade Agreement, Arizona's three major ports of entry (Nogales, Douglas and San Luis) have experienced a 10% growth in the number of commercial vehicles crossing each year.[9]
- Commercial vehicle traffic (vehicles weighing more than 26,000 pounds) on key interstate highways in Arizona has more than doubled over the decade and this trend is expected to continue. The following table illustrates this trend:

Table 1-3-1

Annual Commercial Vehicle Counts
(Trucks > 26,000 Gross Vehicle Weight)

	I-8	I-10	I-17	I-19	I-40
1990	39,989	948,200	307,200	31,400	313,300
1995	39,234	1,567,100	486,400	38,600	364,000
2000	61,900	2,002,700	598,800	80,200	610,700

Source: ADOT Transportation Planning Division

New engine technology, cleaner fuels, and pending federal standards should greatly reduce vehicle emission levels in the near future, although air quality will remain an important consideration in developing transportation plans.

- Automobile emissions have dropped dramatically since the 1960s and emissions will continue to decline in the years ahead.
- The following table illustrates the significant improvements in auto emissions standards, since 1960.

Table 1-3-2

Auto Emission Standards
Grams of Emission per Mile Traveled

Model Year	Hydrocarbons	Carbon Monoxide	Nitrogen Oxide
1960	10.600	84.000	4.100
1970	4.100	34.000	5.000
1975	1.500	15.000	3.100
1980	0.410	7.000	2.000
1981	0.410	3.400	1.000
1983	0.410	3.400	1.000
1994 (Tier 1)	0.310	4.200	0.600
2004 (Tier 2)	0.125	4.200	0.200

Source: 1997 Arizona Transportation Research Center Study

- Sulfur is the primary element that causes the emission of black soot from diesel engines. The Environmental Protection's Agency (EPA) has proposed new rules to cut sulfur content in diesel fuel by 95% effective June 2006. Beginning in 2007, diesel engine makers will have three years to produce engines that cut the emission of nitrogen oxide by 97% and particulate matter by 90%.

- Several transit buses, powered by hydrogen fuel cells (that emit only water vapor) are being tested and used in British Columbia, Canada. Transit officials believe that these hydrogen-powered buses will be utilized more by municipalities throughout the county over the next 10 years as this new technology becomes more affordable.[21]

- General Motors is test driving a hydrogen-powered minivan at its test facility in Gilbert, Arizona. This zero emissions vehicle utilizes fuel cell technology to convert hydrogen into electricity. Test results indicate that the minivan's performance and fuel economy is similar to a gasoline-powered van. The hydrogen-powered minivan emits only water vapor. General Motors anticipates that these hydrogen-powered vehicles will be available to the public in the next 10 years (General Motors Desert Proving Ground).

"Smart car" technology should enhance traffic safety and increase roadway capacity over the next 20 years.

- Several U.S. auto manufacturers are developing and testing intelligent vehicles that can drive themselves using on-board computers, radar technology and sensors that follow magnets embedded in a roadway. These "smart cars" are being sold and operated in some areas of Denmark and Japan.

- Within the next few years, collision warning and crash avoidance systems will be standard equipment or optional features in new cars. These systems are an extension of cruise control systems that have been common in most vehicles for many years. The National Highway Traffic Safety Administration has estimated that over 500,000 crashes could be avoided annually and close to 10,000 lives saved, with the full deployment of these systems. Additionally, the Federal Motor Carrier Safety Administration has set a goal of a 50% reduction in fatalities from heavy truck crashes through the use of this intelligent vehicle technology.[25]

- ADOT is currently testing new snowplows that are guided by computer technology that reads magnets embedded in the roadway. Full deployment of this technology will significantly reduce the time to clear snow on state highways.[11]

Transit

Public transit serves several different functions in Arizona. It provides mobility to persons without access to an automobile and to those who do not drive. It provides important links between rural communities and metropolitan areas. In general, over the last five years, transit ridership in the Phoenix Metropolitan area has increased by 7%; decreased by 10% in the Tucson Metropolitan area; and increased slightly in other areas of the State.

- Private intercity bus service operates along the major travel corridors in Arizona. Passenger service is available in 83 communities and connects these cities with other urbanized areas in Arizona and other states.[2] Exhibit F shows the major intercity bus corridors in Arizona and the average number of daily round trips.[2]

- The major east-west interstate routes through Arizona -- I-40 in the north and I-10 and I-8 in the south -- resulted in frequent service along these corridors. Travel between California and Texas, the two most populous states, has a greater influence on the levels of service on these routes more than demand within Arizona.[2]

- Routes operating between California and Texas run primarily on I-10, while those serving San Diego split off to I-8. Service between Albuquerque, New Mexico and Las Vegas, Nevada operates on I-40.

- Demand for north-south service from Mexico supports a high level of service on the I-19/I-10 corridor, particularly from Nogales to Phoenix.[2]

Statewide Transportation for the Elderly and Disabled – Section 5310 Program

- The Section 5310 Federal Transit Administration (FTA) program provides assistance in meeting the transportation needs of elderly persons and persons with disabilities where public transportation services are unavailable or insufficient.[2] This program provides capital assistance for transportation to private non-profit organizations, Indian tribes and some public agencies statewide. The program is administered by ADOT and coordinated at the regional level by the Councils of Governments and Metropolitan Planning Organizations. Exhibit G illustrates the Section 5310 service locations within Arizona.[2] The following table shows various statistics of the Section 5310 Program.

Table 1-3-3

Section 5310 Program Statistics

	1996	2000	% of Difference
Vehicles	87	93	+ 7%
Vehicle miles	880,280	972,075	+10%
Passenger trips	341,340	377,100	+10%
Total cost	$2,321,999	$2,788,000	+12%
Cost per vehicle	$26,689	$29,978	+12%
Cost per passenger trip	$6.80	$7.39	+9%

Source: Arizona Department of Transportation, Transportation Planning Group, Transit Team

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Transportation for Rural and Small Urban Areas – Section 5311 Program

- The FTA's Section 5311 program provides capital, administrative and operating assistance for public transportation programs in rural and small urban areas (under 50,000 population).[2] This program is administered by ADOT. Councils of Governments review and comment on applications received for projects in their planning areas. Exhibit G also illustrates the Section 5311 service locations.[2] The following table shows various statistics of the Section 5311 Program:

Table 1-3-4

Section 5311 Program Statistics

	1996	2000	% of Difference
Passenger trips	490,516	517,861	+6%
Passenger (project) miles	1,647,196	1,727,441	+5%
Total cost	$2,845,790	$3,537,836	+24%
Farebox recovery ratio	0.22	0.22	0%
Cost/passenger trip	$5.80	$8.30	+43%
Fare/passenger trip	$1.14	$1.88	+65%
Cost/project mile	$1.72	$2.56	+49%

Source: Arizona Department of Transportation, Transportation Planning Group, Transit Team

Phoenix Metropolitan Area Transit Services

- The Regional Public Transportation Authority (RPTA) provides a structure to enable the various cities in Maricopa County to operate a coordinated public transit system. Phoenix, Mesa, Tempe, Scottsdale, Chandler, Peoria, Gilbert, Glendale, Avondale, El Mirage and Maricopa County participate in RPTA.[2]
- Fixed route and demand response transit services funded by these jurisdictions and regional services funded through RPTA operate as Valley Metro.[2] The following table shows various statistics of the Valley Metro transit system.

Table 1-3-5

RPTA Transit Statistics

	1996	2000	Difference
Size of fleet	468 buses	589 buses	+26%
Average vehicle age	9.48 years	6.03 years	-36%
System capacity	16,833 seats	21,358 seats	+26%
Passengers	35,028,406	37,496,804	+ 7%
Passengers per vehicle hour	39.40	29.55	-25%
Passengers per vehicle mile	2.56	2.08	-19%
Operating cost per passenger	$1.51	$1.99	+32%
Operating cost per vehicle mile	$3.86	$4.14	+ 7%
Revenue per passenger	$0.55	$0.61	+11%
Farebox recovery ratio	36.4	30.8	-15%

Source: Arizona Department of Transportation, 1997 Transit Plan and Regional Public Transportation Authority

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Tucson Metropolitan Area Transit Service

- The City of Tucson and Pima County fund most transit services in the Tucson metropolitan area.[2]
- The City of Tucson oversees the operation of Sun Tran which services Tucson, South Tucson, the Town of Oro Valley and the unincorporated portions of Pima County. Pima County operates specialized services in he unincorporated areas.[2]
- Intergovernmental agreements are in place to provide service outside city limits. Pima County operates specialized services in the unincorporated county area, regional services from Marana to Tucson, Ajo to Tucson, and demand response services in Ajo.[2]
- The following table shows various statistics of the Tucson Sun Tran transit system.

Table 1-3-6

Sun Tran Transit Statistics

	1996	2000	Difference
Passengers	16,170,758	14,513,188	-10%
Miles of service	7,788,943	7,771,459	- 2%
Farebox revenue	$6,030,214	$7,267,371	+21%
Operating costs	$22,498,947	$30,804,320	+37%
Passengers per vehicle mile	2.08	1.87	-10%
Operating cost per passenger	$1.39	$2.12	+53%
Operation subsidy per passenger	$1.02	$1.62	+59%
Farebox recovery ratio	26.8	23.6	-12%

Source: Tucson Sun Tran

Table 1-3-7

Flagstaff Transit Statistics

	FY 2002	FY 2005	% Difference
Size of Fleet	6	16	+167%
Passengers	1	2	+233%
Passengers/Vehicle Hour	150,000	500,000	+36%
Operating Cost/Passenger	4.22	3.73	-12%
Operating Cost/Mile	3.30	3.30	0%
Revenue Per Passenger	.75	.75	0%
Farebox Recovery Ratio	17%	20%	18%

Source: City of Flagstaff

Flagstaff Metropolitan Area Transit System, Mountain Line

- Mountain Line, unlike other systems in the State, is a new transit service, which began in October 2001. The City of Flagstaff passed a transit tax in May 2000 and the above plan (Table 1-3-7) is being implemented over the next four years.

Local Transit Assistance Fund II (LTAF II)

The state's transit assistance program (LTAF II) has supported essential transportation service in rural communities throughout the state.

- The Local Transportation Assistance Fund II (LTAF II) was created by state legislation in 1998. LTAF II was originally funded with federal Surface Transportation Program monies received by ADOT. In 2000, use was restricted to transit, unless a jurisdiction's allocation is less than $2,500 per year.

- Today, LTAF II is funded through State General Fund appropriations and a portion of PowerBall lottery proceeds. The program is capped at $18 million annually, however, only $7.5 million was appropriated by the Arizona Legislature for FY 2002.[13] Exhibit H summarizes the maximum amount each county or municipality could receive in FY 2000 under the $18 million cap.

- The program is scheduled to sunset on October 1, 2003, with the expiration of the current Federal Transportation Reauthorization Act (TEA-21).

- In the beginning, some jurisdictions were hesitant to start up new transit service or services for special needs populations (para-transit service) with their LTAF II allocations because of the uncertainty surrounding future LTAF II funding (legislative appropriation and lottery sales). Recently, many jurisdictions have pooled their LTAF II allocations to establish new transit routes or para-transit service.[3]

- ADOT has worked with rural communities to leverage their LTAF II allocations with federal Section 5310 (Elderly and Persons with Disabilities) and Section 5311 (Rural Public Transportation) programs. The State Transportation Board allocated $5 million in FY 2000 for jurisdictions that use 100% of LTAF II for transit purposes.[3]

- The following are some examples of how different municipalities have pooled their LTAF II allocations to operate transit and para-transit services[3]:

Phoenix Metropolitan Area: Avondale, Goodyear, Litchfield Park, and Tolleson have established the Southwest Transit and Regional Transportation (START) route. Prior to START, residents in the southwest part of the Phoenix metropolitan region did not have local transit service. START provides service to Estrella Mountain Community College, Desert Sky Mall,and the Desert Sky Park & Ride Lot, where commuters can access express bus service. Average monthly ridership has grown from 95 daily passengers in the first year to 165 in 2001. In FY 2000, $194,584 in LTAF II revenues were used to support START. In the past, federal appropriations of $400,000 have also supported this transit service.

Southeastern Arizona: Huachuca City and Tombstone use their LTAF II monies to partner with the Sierra Vista Transit System. This partnership enables senior citizens in Tombstone and Huachuca City to travel to Sierra Vista two days a week.

Northeastern Arizona: Show Low, Pinetop-Lakeside, and Navajo County use their LTAF II allocation to fund the Four Seasons Connection Transit System. The System has experienced significant growth in ridership, especially among disabled and wheelchair riders.

Central Yavapai Region: Prescott, Prescott Valley, Chino Valley, and Yavapai County have combined their LTAF II allocations to fund a voucher transit system. This system is administered by the Northern Arizona Council Of Governments (NACOG) and provides transportation to the elderly, disabled, low income and youth populations. The system enables clients to select from an approved list of private sector providers and redeem vouchers for qualified trip purposes such as: employment, job search, medical visits, social service agency visits, education, and basic transportation needs. From April through July 2001, 13,514 trips were provided by this voucher transit system.

Light Rail Transit Service

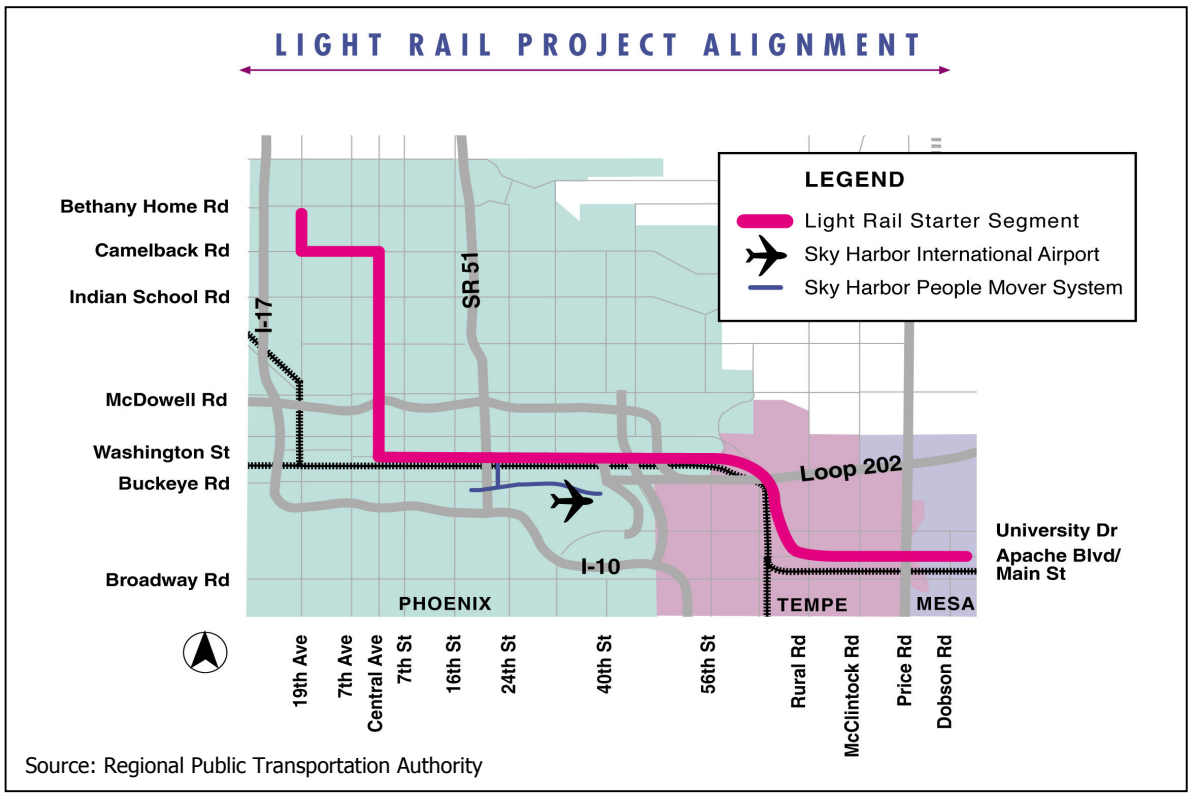
Maricopa County Region

- The Phoenix 2000 transit tax is expected to provide $1.654 billion over a 20-year period to help fund the construction and operation of a light rail transit system

- In October 2001, the Federal Transit Administration approved the first $1.1 billion project that will link Central Phoenix to Tempe and Mesa. The first 20.3-mile segment is due to be completed in 2006. By 2020, estimated ridership on this initial segment is expected to be 48,000 passengers per day. The map on the following page illustrates the light rail corridor.

- The recently approved Glendale transportation tax is expected to generate approximately $170 million for the development of a light rail transit system that links with the Phoenix system near Chris Town Mall (at approximately 15th Avenue and Bethany Home Road in Phoenix).

- Other area cities, including Scottsdale, Tempe, and Chandler are evaluating extending the proposed light rail system to their communities. Scottsdale and Tempe have funded a $750,000 study on a possible north-south link and Chandler is conducting a $240,000 feasibility study.



Source: Regional Public Transportation Authority

Tucson Region

- In 1993, an historic trolley system was reactivated providing transit service between the University of Arizona and the Fourth Avenue Business District. The 1.1mile long trolley system currently operates only on Fridays, Saturdays and Sundays along with school charters. The trolley system and currently carries an average of 20-25,000 riders each year.

- According to the Old Pueblo Trolley (OPT), the non-profit organization that operates the system, there is a desire to provide full-time service (seven days a week, 18 hours per day). Current plans will expand the track from Fourth Avenue along Congress Street to the Tucson Convention Center. The capital cost for this expansion is approximately $5 million for rail infrastructure and $3 million for 12 new or restored trolleys. The operational cost of this expanded service is $600,000 per year.

- An organization known as Tucsonans for Sensible Transportation (TST) is advocating for the construction of a 13 mile light rail transit system be included as part of a potential Tucson transportation tax election. TST estimates that the capital cost of this system to be $35 million per mile for a total of $455 million with federal funding paying for 60% of the capital costs. The estimated annual operational costs are $4 million. The estimated daily ridership of the system is expected to be 30,000 per day.[14]

Aviation

Air passenger service is expected to increase dramatically in the two large metropolitan areas over the next 20 years. Air cargo service and general aviation are expected to increase throughout Arizona over the next 20 years.

- Over the next 20 years, total passenger arrivals and departures on commercial aircraft flying into and from Sky Harbor International and Tucson International airports are expected to increase 79% to a combined total of nearly 36 million passengers, annually.[15]

- Over the past five years, the number of general aviation aircraft based within Arizona has increased by 9.7%. This sustained growth in general aviation usage is expected to continue with an estimated increase of more than 30% in total-based aircraft over the next 20 years.[15]

- The tonnage of cargo passing through Sky Harbor International Airport Air increases each year. In 1996, approximately 297,000 tons of cargo went through this facility. In 2005, about 600,000 tons of air cargo are expected to be handled at Sky Harbor and over 1,000,000 tons of air cargo are expected in 2015.[16]

- While there are a number of unique factors affecting the growth of air cargo at Tucson International Airport (e.g. trade activity with Mexico), Tucson Airport officials anticipate that air cargo tonnage will more than double by 2020. Approximately 31,000 tons of air cargo went through this facility in 2000 and the amount of tonnage projected for 2020 is over 75,000 tons.[17]

- The 1999 Arizona Small Community Economic Development and Transportation Study (ASCET) indicated that expanding runway lengths, installing advanced air-to-ground communication systems and constructing other supporting infrastructure such as refrigerated hangers would enhance air cargo service to communities throughout Arizona, including, Safford, Kingman, Casa Grande and Yuma.[1]

Freight Rail

Transportation of manufactured goods and raw materials via freight rail will increase substantially over the next 20 years.

- Currently, between 60 and 70 trains per day move freight along the Burlington Northern Santa Fe main line in northern Arizona. Rail freight movement along the Union Pacific main line in southern Arizona is in the range of 40 to 50 trains each day. In the next five to ten years, daily train movements along both of these mainline corridors are expected to increase by 15 to 20%. [3]

- ADOT, state and regional studies indicate that traffic congestion is a growing problem at several key at-grade roadway/railroad crossings, especially in Flagstaff and Pima County. There are a number of rail crossing sites that are candidates for grade separation improvements. In the Flagstaff region, Lone Tree Road/Elden Street, Enterprise Road, and 4th Street. In the Tucson Region: Tangerine Road, Cortaro Farms Road, Ina Road, Prince, 6th Street, Ruthrauff, Craycroft/Wilmot Road, Kolb Road, and Houghton Road. In the Phoenix region, there are eight grade separated interchanges scheduled for construction along Grand Avenue over the next seven years. [3]

- The City of Nogales also has a very acute railroad problem. Since 1994, the number of northbound rail cars passing through downtown Nogales each year has more than doubled. In 2000, 48,305 rail cars passed through Nogales. Some trains are as long as 7,500 feet, which blocks up to 3 street intersections at one time.[19]

Travel Reduction Strategies

Commuter travel in the two large metropolitan areas is a small percentage of total VMT and total daily trips. Commuter travel is defined as the daily trip an employee makes from his or her residence to their primary place of employment.

- According to the MAG model, commuter trips represent only 20% of total daily trips and only 33% of the total daily VMT in the Maricopa County region.

- According to the PAG model, commuter trips represent only 19% of total daily trips and only 19% of total daily VMT in the Pima County region. The PAG model indicates that these percentages of commuter travel to total travel are not expected to change much over the next 25 years.

Formal travel reduction programs in the Maricopa County Pima County regions have existed since the 1980s. Research indicates that greater utilization of some travel reduction strategies can reduce regional Vehicle Miles of Travel and provide minor air quality improvements.

Travel Reduction Programs - General

- According to the 2000 census, 1.6 million of the 2.2 million workers in Arizona (older than 16) commute to work by themselves in trucks, vans or cars; nearly 326,000 carpool; and 47,000 use public transportation including taxis. About 47,000 walk to work and 78,000 work out of their houses.[20,21]

- In 2000, 248 employer sites and 110,292 employees were included with the Pima County Regional Travel Reduction Program. In 2000, about 31.62% of these employees participated in some aspect of a travel reduction program.[22]

- In 2000, 1,200 employers with 2,400 employer sites were included within the Maricopa County Regional Travel Reduction Program. These companies employ over 600,000 workers. In 2000, only 33% of the participating major employer sites met their travel reduction goals.[23]

State Bus Card Subsidy Program

- Since 1994, the State of Arizona has provided a bus pass subsidy for state employees within the Phoenix and Tucson regions. The subsidy has ranged between 50% and 100% of the rider's cost and is currently 65%. The subsidy is available for both public and private mass transit operations under contract with the state. Currently, only one private firm is participating in this program. The following table summarizes key information about this State program.[2]

Table 1-3-8

Travel Reduction Subsidy Information FY 2000-2001

	Average Monthly Ridership	Average Monthly Subsidy
Bus Card Plus Subsidies (Valley Metro)	2,040	$29,400
Bus Subsidies (Sun Tran)	58	$1,050
Private Bus Subsidies	17	$260
Vanpool Subsidies	278	$5,500

Source: State of Arizona Travel Reduction Office

- The Federal Commuter Choice Program provides employers with a tax credit of up to $65 for each employee that utilizes transit or a vanpool program. Utilization of the program has been limited because the tax credits are minimal and the employer's administrative time requirements are substantial .[22]

Dial-a-Ride or Jitney Service

- A recent survey indicates that 23% of Dial-a-Ride customers in the Phoenix metropolitan areas waited for more than two hours for a ride at least once in the prior six months. Nevertheless, this para-transit service is heavily utilized, especially in the Phoenix metropolitan area. In this region, more than 660,000 persons used Dial-a-Ride in the Phoenix metropolitan area in FY 2000.[21]

- Currently, there is no general Dial-a-Ride program in the metropolitan Tucson area, however, there is a service know as "Van Tran" which provides transportation service to Tucson residents for certain eligible purposes. In 2000, Van Tran provided approximately 310,000 trips in the Tucson region.[22]

- According to the Yuma Metropolitan Planning Organization, Dial-a-Ride in the Yuma region turns away an average of 125 general transit passengers per day.[25]

Ridesharing

- Recent surveys indicate that approximately 15% of employees participate in a rideshare program at least once a week in the Phoenix region and 16% of employees rideshare at least once each week in the Tucson region. According to recent U.S. Census Bureau data, Arizona ranks 2nd in the U.S. for carpooling.[21,22]

- Currently, 22% or 298,000 commuters carpool one or more days each week, with the average for these individuals being 3.1 days per week in the metropolitan Phoenix area. A 10% increase in rideshare participation (at least once each week) would reduce commuter VMT by 230,200 miles per day and 58.7 million miles per year. Carpool commuters in the region save 2.3 million miles per day or 83,000 pounds of pollution per day.[21]

Telecommuting

- Data from the 1990 census indicates that there were approximately 600,000 commuters in Phoenix and 100,000 commuters in Tucson, whose jobs are conducive to telecommuting,[21,22]

- A 1999 survey indicated that 66% of Phoenix area business owners feel there is potential for establishing a telecommuting program among their employees.[21]

- According to RPTA surveys, about 135,000 persons currently telecommute or work at home one day or more per week. (This figure excludes home-based and self-employed workers). These employees telecommute on average 2.7 days each week. This represents a doubling of employee participation in telecommuting since 1996.[21] A 1997 study indicated that if 25% of eligible employees telecommuted one day a week, commuter weekday VMT would be reduced by 372,600 miles in the Phoenix region and 59,940 miles in the Tucson region.[4] However, this is less than a 2/10ths of 1% reduction in VMT.

- Seventy-one state agencies located in Maricopa County have reported that over 15% of their employees telecommute one or more days per week.[24]

- The Pima County 2000 Trip Reduction Program survey indicates a 195% increase in telecommuting over 1999 data, with 3,906 participating employees.[22]

Flex-time and Compressed Workweek Programs

- Recent market research conducted for RPTA indicates that 122,000 employees in the Phoenix region participate in a compressed workweek program, where the number of hours per day is increased to reduce the number of work days each week (e.g. four ten hour days rather than five eight hour days). It is estimated that 20,898 employees currently participate in one of these alternative work schedule programs in the Tucson region.[21,22]

- According to RPTA, a 10% increase in utilization of flex-time or a compressed workweek schedule would reduce commuter VMT by 81,500 miles per weekday or 407,000 per workweek in the Phoenix region. A 10% increase in this travel reduction strategy in the Tucson region would reduce commuter VMT by 26,000 miles per week.[21,22]

Proximate Commuting

- A 1997 study conducted by the Arizona Transportation Research Center indicated that about 40% of commuters in the Phoenix region work for multi-site employers and 60% of these multi-site employees do not work at the site nearest their home. The study indicated that transferring 10% of these eligible employees to a work location nearer their home would reduce their daily VMT by 65% or a total estimated commuter VMT reduction of 359,000 miles.[4]

- The 1997 study also indicated that if approximately 4,200 eligible employees participated in a "proximate commuting" program, regional weekday commuter VMT would be reduced by 57,000 miles.[4]

Bicycling or Walking

- There are approximately 31,000 miles of paved roads available for bicycling statewide. On the State Highway System there are approximately

6,000 miles of roadway with shoulders available for bicycling. About 1,000 of these miles are Interstate routes (excluding 154 miles of Interstate where bicycling is prohibited). Approximately 2,800 miles (47%) of the State Highway System are designated as more suitable for bicycling and the remaining 3,200 miles (53%) are rated as less suitable for bicycling.[2]

- The Tucson region has 425 miles of signed bike routes, six miles of separated bike lanes, 50 miles of urban shared use paths and 7.5 miles of bus shared use lanes for a total of 488.5 miles of bikeways, according to PAG.

- In Arizona, the majority of bicycling takes place in the urban areas of Phoenix, Tucson, Flagstaff, Prescott and Yuma. The table below indicates the current number of bikeway miles in each of these regions.

- Maricopa County travel reduction surveys of major employers indicate that 10,797 employees ride their bikes to work at least once each week. Surveys by the MAG Regional Bicycle Task Force indicate that as many as 45,000 persons commute to work via bicycle. On average, these persons bicycle to work 3.3 days per week. These surveys also indicate that 67,000 persons walk to work one or more days per week. They walk to work an average of 3.5 days per week.[21,22]

- RPTA estimates that a 10% increase in bicycle commuting by eligible employees in the Phoenix metropolitan area would reduce commuter VMT by 28,900 miles per day.[21]

- Surveys in the Tucson area indicate that 2,561 employees used a bike to commute to work at least once each week in 2000. This is a 4% decrease over the previous year. These 2000 surveys indicate that 2,140 employees walk to work. This represents a 6% increase over the previous year.[22]

- A 10% increase in bicycle commuting by eligible employees in the Tucson region would reduce commuter VMT by 1,275 miles per week.[2]

Table 1-3-9

Bikeway Miles

Region	On Street Bikeways	Urban and Suburban Off Road
Phoenix	1034.15 miles	310.41 miles
Tucson	438.5 miles	50 miles
Flagstaff	25 miles	22 miles
Prescott	Data unavailable	Data unavailable
Yuma	Data unavailable	Data unavailable

Transportation System Priorities

Pavement Preservation

State and national studies indicate that pavement preservation programs can extend the life of streets and highways and avoid costly roadway reconstruction.

- In 1977, the Utah Department of Transportation documented that for every $1 invested in early preventive treatment of roadway pavement approximately $3 in costs is avoided on subsequent major rehabilitation.[10]

- The U.S. Army Corps of Engineers has determined that the costs to repair deteriorated pavement are four times the cost of applying a thin surface treatment at the proper time, before major deterioration occurs.[26]

- An analysis conducted in 1996, by the National Cooperative Highway Research Program, of 60

different agencies throughout the US and Canada found that $1 invested in preventive maintenance at the appropriate time will save $3 to $4 dollars in future rehabilitation costs. This analysis also found that the use of preventive maintenance programs, at the appropriate time, extended the life of asphalt concrete pavement by 5 to 6 years and the life of portland cement concrete pavement by 9 to 10 years.[26]

- ADOT officials conservatively estimate that an additional $15 million is need each year to maintain state highway pavements at *minimally acceptable* conditions.[3, 11] Exhibit I contains a map and table that illustrates the classification and pavement condition of Arizona's highways.

- A thorough review of regional, county and local transportation plans indicates that pavement preservation on local streets and county roadways is not adequately funded. The Task Force's Needs Consultants conservatively estimate that an additional $2 to $3 billion is needed over the next 20 years to bring local and county roads up to *minimally acceptable* levels.[27]

Low Cost Congestion Relief Strategies

A variety of cost-effective, transportation system improvements could be implemented to enhance mobility and relieve congestion in growing urban areas, especially in the two large metropolitan areas.

Regional Traffic Light Synchronization

- The Institute of Transportation Engineers estimates traffic signal improvements can reduce travel times between 8% and 25%. Advancements in traffic light technology also reduces vehicle emissions and fuel consumption.[10]

- Advanced traffic light technology is being implemented in both the Tucson and Phoenix areas, to a very limited extent. Substantial opportunities remain in both regions. The City of Tempe is currently testing a real-time, adaptive traffic signal system. The City of Tucson has been installing video-based detection systems to enhance "real time" traffic monitoring. In the near future, this technology should enable computers at the Tucson Traffic Operation Center to automatically adjust traffic signals cycles to compensate for changing traffic conditions. This advanced technology is being operated along a 2-mile segment of Speedway Boulevard.[28] Exhibit K illustrates the number of signals that are linked to the Tucson Transportation Operation Center.

- Currently, ADOT utilizes traffic signal computer hardware (controllers) that are not always compatible with local traffic signal systems. ADOT has a policy that requires the Department to upgrade its controllers before turning over jurisdiction of a traffic signal to a local entity.

- A number of metropolitan cities have implemented various forms of advanced adaptive traffic control systems including: Beverly Hills, Michigan; Los Angeles, California; Toronto, Canada; Paris, France; Oakland, California; and Madrid, Spain. Adaptive traffic control systems reduce vehicle stops by 10 to 41% and reduce traffic delays by 14 to 44%. The studies indicate that benefits of these advanced systems depend on several variables, such as number of intersections, spacing between lights, corridor lengths and vehicle demand patterns.[10]

- As an example, São Paulo, Brazil installed an adaptive signal control system along its major commuter, commercial and service route (Av. Lins de Vasconcelos). The system reduced delays 14.4% in a 15-hour study period and travel speeds improved 14%. Mid-day average travel speeds improved 25%. Similarly, an adaptive signal control system (107 intersections) in Madrid, Spain reduced average travel time by 5%. Flow through the area was improved by reducing the number of stops by 10% and traffic delays by 19%.[10]

Express Bus or Bus Rapid Transit Service

- Federal Transit Administration reports indicate that express bus or bus rapid transit (BRT) is being used more and more to reduce congestion in major metropolitan areas such as Los Angeles, Pittsburgh, Orlando, Miami,

Ottawa, Cleveland, Nashville, Boston, Las Vegas and Washington, D.C.[29]

- Currently, there are 21 express bus routes and 70 buses dedicated to express bus service in the Phoenix metropolitan region. The current fare for express bus service is $1.75 and monthly passes are available at a cost of $51. Approximately 23% of express bus operating expenses are recovered through the farebox. Current express bus ridership is about 1,675 riders in each daily peak period.[21]

- Presently, there are only 14 buses that provide "express bus" service between the eastern Maricopa County cities and Phoenix. The ability to provide adequate, regional express bus service has been hampered by limited funding, the incomplete High Occupancy Vehicle (HOV) lane system, and a lack of Park & Ride lots.[21]

- Initial modeling by the Regional Public Transportation Authority (RPTA) in Maricopa County indicates that five additional routes and doubling the number of express bus service miles on an expanded HOV lane system in the Phoenix region would nearly quadruple express bus ridership. The model indicates that at least 5,850 commuters would utilize expanded express bus service in the peak period each day, compared to current peak-period ridership of 1,675.[21] The following chart compares the current express bus system in the Phoenix region to the expanded service outlined above.

Table 1-3-10

RPTA Express Bus Statistics

Factor	FY2000	FY2025 (est.)
Routes	21	26
Avgerage Daily Ridership	3.150	11,500
Miles	796,000	1,400,000
Peak of Peak Frequency	30 minutes	15 minutes
Span of Service	2.5 hoursam/pm	4 hours am/pm
Average Ridership	23/one way trips	41/one way trips
Round Trips	70	140
Fleet Requirements	68	125
Estimate Avg. Speed	23 mph	29 mph
Ops Costs (2000$)	$4M	$8M+
Annualized Capital Costs	$2M avg. annual	$3.65M avg. annual

Source: Regional Public Transportation Authority

- In the Tucson metropolitan area, Sun Tran, the area's transit provider requires private employers to pay 100% of the cost of express bus service for their employees, although Sun Tran operates 9 of the 37 routes in the region. (Sun Tran) uses its revenues to support local transit and Dial-a-Ride service.) A recent study identified the following corridors as good candidates for regional express bus service: Broadway-St Marys Road; Craycroft to Tucson International Airport; Grant Road from the University's downtown complex to Ajo Highway; Interstate 10 and Interstate 19; Oracle Road; La Cholla-River Road-Alvernon to Pima Community College East campus; Sunrise-Skyline-Ina Road Corridor; from the Southwest Laos Transit Center to Broadway-Kolb and Tanque Verde Corridors.[28]

- Currently, at least one private charter bus company provides commuter express bus service for several major employers in the Phoenix metropolitan area. Several of the express bus routes served by the private provider are at capacity. The company uses 47 or 55 passenger buses.[30]

Vanpooling

- RPTA in the metropolitan Phoenix area currently uses federal and state funding to provide vanpool service in the region. Currently, there are 204 vans operating in the region serving about 1,895 commuters each weekday. The annual operating cost for this program in FY 2000 was $1.2 million. Farebox revenues cover 100% of the operating costs and a portion of the capital costs. Each van travels approximately 67.3 miles each weekday and carries an average of 9.7 persons per van.[21]

- RPTA is transitioning from privately owned vans to RPTA owned vans. When fully implemented, this will result in a higher coverage of capital costs percentage.

- According to RPTA, there is sufficient demand to operate an additional 500 to 1,000 vans in the metropolitan Phoenix area. The estimated cost to add 100 vans per year is $2.5 million (capital) and $500,000 (administrative). The cost of operating an expanded vanpool program would be negligible, presuming that federal monies are available to purchase the vans. RPTA estimates that this vanpool expansion would carry 9,700 additional passengers per weekday and would reduce weekday commuter VMT by 11,000 miles per day or 11.2 million miles per month or 135 million miles per year. This expanded vanpool program would also eliminate approximately 3.6 million pounds of pollution per year.[21]

- According to RPTA, there are 12 non-subsidized vanpools operating outside Maricopa County, six operating in Pima County and six operating in Pinal County.

- In Pima County, Raytheon Missile Systems has taken the initial step to subsidize a vanpool at $14 per seat per month. Raytheon is using a private firm to provide the van, insurance and maintenance. The 2000 Pima TRP survey showed a 10% increase in vanpooling, with 277 participating employees.[22]

Additional HOV Lanes and Connecting Ramps

- In Houston, Texas there is a 90-mile network of connected HOV lanes, direct access ramps, Park and Ride lots and transit centers. These HOV lanes carry up to 40% of the travelers on these routes during the peak hour and reduce travel time an average of 2 to 18 minutes during the morning peak period.[31]

- Currently, barrier-separated, reversible HOV lanes operate on six Houston freeways. Frequent express bus service is provided to downtown Houston and other major activity centers from 24 Park and Ride lots. In 2000, approximately 106,400 people used Houston's HOV lanes daily, including 42,400 bus riders, 1,620 vanpool riders, 62,260 carpool commuters and 120 motorcyclists. These HOV lanes provided travel time savings of 4 to 22 minutes compared to general-purpose lanes.[31]

- According to the Transportation Research Board, development of an HOV lane system has been an effective congestion reduction strategy in several metropolitan areas, including San Diego, Orange County, California, Seattle, Northern Virginia and Washington D.C.[31]

- HOV and Carpool lanes reduce congestion on urban freeways. For example, in the metropolitan Phoenix area, the eastbound Interstate 10 the HOV lane at 39th Avenue carried more people during the average morning rush hour (3,250 people) than any of the adjacent general-purpose lanes (2,250 people/lane). During the evening peak period, the westbound Interstate 10 HOV lane carried 2,000 more people than any of the adjacent general-purpose lanes.[32]

- ADOT studies indicate that the cost of constructing a system of HOV lanes throughout the entire Maricopa Regional Freeway System would be offset by the time-savings and increased job productivity, although these savings could not be used to fund the improvements. For example, adding an HOV lane on the Price Freeway, from SR 202 to US 60 would cost $12.5 million, but would generate a $4.47/hour savings for each HOV commuter each day.[32] Exhibit L compares the cost of

adding HOV lanes and dollars saved per hour in lost job productivity.

- Completing the proposed Maricopa Regional HOV Lane Plan would reduce vehicle miles traveled (VMT) and would reduce delays during peak periods**.** By 2020, the proposed HOV Plan is estimated to reduce peak morning commuter VMT by nearly 22.5 million miles per day, which represents 23.6% of total projected VMT for the Maricopa region at that time. The proposed HOV Plan is expected to reduce 2020 morning peak-period delays by over 30,000 hours per day**.**[32]

- The estimated total cost to build 20 additional Park & Ride lots, 14 ramp connectors, 2 freeway to freeway HOV ramps, an additional bus station and 93 additional miles of HOV lanes on the region's freeway system is approximately $750 million.[32] Exhibit L provides more detailed information on this proposed expansion of the Maricopa Regional HOV Lane System.

High Occupancy Toll (HOT) Lanes

- Like HOV lanes, High Occupancy Toll (HOT) lanes increase the capacity of existing freeway corridors. HOT lane users pay a fee for use of the HOV lanes, without the multiple passenger requirements. The fees paid by these HOT lane users capture a portion of the time and productivity benefits received by the HOT lane user and contribute to funding HOT lanes and other transportation improvement.

- In California, conversion of HOV lanes to HOT lanes has increased carpooling. The Interstate 15 HOT Lane Program near San Diego, California has been operational for the last six years. The average rush hour fare on the Interstate 15 HOT lanes is $2.25 per one-way trip. A value pricing system has been in place on the 91 Express Lanes near Anaheim, California since December 1995. With the value pricing system, trip fares are increased as demand for the HOT lanes increases. The average rush hour fare on the 91 Express lanes is $2.90 per one-way trip. [32]

- California HOT lane facilities have improved traffic flows on adjacent general-purpose lanes. Average peak period speeds in the general-purpose lanes have increased from 15 mph to 32 mph and morning peak period congestion has decreased by 25%.[32]

- A recent study concluded that it would cost approximately $20 million to convert the existing or programmed HOV lanes along the Superstition Freeway and Interstate 10 to HOT lanes, between eastern Maricopa County and downtown Phoenix, with an average net annual revenues of $9.9 million by the year 2010.[32]

Bus Pullout Lanes

- Bus pullouts facilitate the orderly flow of traffic and improve safety on major urban arterials used by local buses.

- Currently, there are 475 bus pullouts in Phoenix, 61 in Tempe, nearly 100 in Scottsdale, 20 in Chandler, 48 in Glendale and 38 in Mesa. As part of Transit 2000, the City of Phoenix Transit Department plans to build 20 additional pullouts each year over a 20-year period. In addition, the City of Phoenix Street Department plans to construct up to five additional pullouts each year for the next 20 years. (RPTA, City of Chandler and City of Glendale)

- Fifty bus pullouts are under consideration for funding from a proposed Tucson local transportation sales tax.

- The average cost of a urban bus pullout in constant 2000 dollars is about $55,000. Typically, funding for additional bus pullouts has been a component of recent transit tax or bond elections throughout the state.

National studies indicate that 50 to 60% of all traffic congestion is attributed to incidents (e.g., minor accidents, stalled or abandoned vehicles on the freeway shoulder, large debris in roadway). These studies also indicate that formal incident management programs and freeway management systems are two effective strategies for reducing congestion.

Incident Management Programs

- Advanced incident management systems reduce

incidence clearance times by up to 8 minutes. Travel times can be reduced when incident management systems are integrated into freeway management systems. Incident management strategies, such as freeway service patrols and traffic management centers also reduce fatalities resulting from vehicle crashes by 10%, due to earlier detection and removal of stranded vehicles.[10]

- It is projected that by the year 2005, incident-related congestion will cost the U.S. public over $75 billion in lost productivity and will result in over 8.4 billion gallons of wasted fuel.[10]

- Several key incident management strategies were recently implemented in Arizona. "Quick clearance" legislation was enacted. A formal freeway service patrol on the Maricopa freeway system was established and the state incident management plan was developed to expedite the investigation and clearance of crash scenes on our state highways. A statewide communication system was established providing real-time information to motorists about traffic bottlenecks and alternative routes to avoid vehicle crash sites. Since their inception in December 2000, Department of Public Safety freeway service patrol units operating on Maricopa regional freeways have assisted 2,876 stranded motorists, helped remove 1,146 abandoned vehicles, participated in 81 collision crash investigations and participated in 717 traffic control assignments to re-route traffic due to highway crashes. The freeway service patrol units also remove large debris from the highways, thereby reducing vehicle crashes.[33]

- Estimates from the San Francisco area indicate that freeway service patrols have reduced hydrocarbons by 32 kg/day; CO emissions by 322 kg/day and NOx emissions by 789 kg/day.[28]

- The Minnesota Highway Helper Program has reduced the time a disabled vehicle remains on the roadside, by eight minutes. Based upon current data, it is estimated that this program reduces the cost of delay by $1.4 million and costs approximately $600,000 to operate annually.[28]

Freeway Management Systems

Since 1988, ADOT has allocated funding to install Freeway Management Systems throughout the Maricopa Regional Freeway System. Currently, ADOT and the State Transportation Board typically allocate money each year to expand the system. Historically, federal monies have covered 90% of the funding for Freeway Management System improvements. Exhibit M illustrates the Freeway Management System for the Phoenix Metropolitan area; Exhibit N shows the Rural Variable Messages signs in the state; and Exhibit O shows the Rural Cameras in the state.

- U.S. Department of Transportation studies indicate freeway management systems (e.g. ramp metering, real-time traffic message signs and television or radio transmission of traffic information) provide the following benefits[10]:

  Average travel time reductions of 20% to 48%;
  Average travel speed increases of 16% to 63%;
  Freeway capacity increases of 17% of 25%;
  Crash rate reductions of 15% to 50%;
  Fuel consumption reductions of 41%; and
  Substantial reductions in emissions.

- A recent study of freeway ramp metering demonstrated the effect of these systems. The extensive ramp metering system on Minneapolis-St Paul area freeways was shut down for a six-week period and revealed the following[10]:

  Freeway volumes declined 9% without ramp meters;
  Average freeway travel times increased 22% without the meters;
  Freeway speeds declined by 7% without meters;
  Accidents increased 26% without meters; and
  Ramp metering generated annual savings of 25,121 hours throughout the system.

Increased Capacity on Major Roads and Highways

Roads of Regional Significance

- In 1991, the Maricopa Association of Governments (MAG) Regional Council adopted design guidelines for Roads of Regional Significance (RRS) throughout the metropolitan Phoenix area. Numerous existing arterial streets were identified as potential roads of regional significance. In general, a principal arterial street every three to six miles would be modified to handle increased traffic volumes by reconstructing these streets to the RRS design standards.[34] Exhibit P outlines the adopted MAG design and access control guidelines for RRS designated corridors. (MAG 1996 RRS Report)

- According to MAG documents, the RRS proposal was adopted because even under the most optimistic future freeway scenarios, the region's arterial street system will carry at least 50% of the vehicles traveling in the region. Currently, 66% of all traffic travels on the grid system and 33% of traffic is handled by the freeways within the Maricopa County region.[34]

- Re-engineering and widening a RRS-designated corridor is a more cost-effective approach to enhancing traffic flows than constructing a new depressed freeway corridor. For example, reconstructing Greenway Road to six lanes cost approximately $3 to $5 million per mile, including right-of-way. Many segments along Greenway Road that previously handled only 12,000 vehicles prior to redesign and reconstruction now handle average daily traffic (ADT) levels of over 60,000 vehicles. The cost of constructing one-mile of urban freeway is about $39 million and a six-lane urban freeway, such as SR 51 (Squaw Peak Freeway) handles an ADT of 160,000 vehicles, according to ADOT.[11,35]

- There are numerous examples portions of city streets in the Phoenix metropolitan area already at RRS standards, such as Chandler Boulevard, Scottsdale Road, Shea Boulevard and Greenway Road. Many RRS-designated routes already have five lanes and only require one more lane to meet RRS design standards.

- In many instances existing traffic signals on RRS designated routes do not conform to RRS design standards, which call for a minimum of ½ mile spacing between traffic signals. According to traffic engineers from both the Phoenix and Tucson metropolitan areas, the installation of traffic lights more frequently than ½ mile apart severely limits traffic light synchronization and disrupts the flow of traffic on major arterial streets.[35,28]

Table 1-3-11

Highways of Statewide Significance

Highway Designation	Corridor Description	Average Daily VMT (thousands)	Corridor Length (miles)	20-Year Cost (millions)
I-8	I-10 Jct. to California Border	2,161	185	167
I-10	California to New Mexico Border	16,953	320	1,738
I-17	Phoenix to Flagstaff	7,126	136	1,466
I-19	Nogales to Tucson	1,915	72	126
I-40	California to New Mexico Border	7,362	388	1,908
US60	I-10 To New Mexico Border	4,710	344	1,068
US89	Flagstaff to Utah Border	2,109	152	346
US93	Wickenburg to Hoover Dam	1,551	184	1,074
US95	San Luis to Bullhead City	1,679	264	451
SR77	Tucson to Globe	1,334	65	163
SR85	Buckeye to Gila Bend	466	40	219
SR260	Cottonwood to U.S. 191 Jct.	1,083	256	464
	Total	**48,449**	**2,406**	**9,190**

Source: Arizona Department of Transportation

Highways of Statewide Significance

- Since 1994, ADOT has conducted 33 comprehensive, long-range corridor studies on highway corridors throughout the State. Twelve major highway corridors have been identified as critical components of Arizona's statewide transportation system. The combined length of these 12 corridors is 2,406 miles or 36% of the State's total highway miles. These major highway corridors also carry 38% of the State's total daily VMT.[3]
- A conservative analysis of the Task Force's Needs database indicates that over $9 billion is needed in the next 20-years to properly fund major improvements (reconstruction and widening projects) on these 12 major highway corridors.[3,11] The table above illustrates the estimated system improvement cost for each of these highway corridors.

Transportation Funding Issues

All Modes

The average costs associated with various modes of transportation are significant in terms of capital costs and annual operation or maintenance costs. The following chart illustrates the estimated costs to implement and maintain various transportation system improvements.

Table 1-3-12

Costs of Various Transportation Modes

Facility or Service	Capital Costs	Annual Operation Costs
Urban Freeway (6-lanes, on/off ramps)	$39 million/mile	$123,000/mile/year (including landscaping, pavement preservation and general maintenace)
Rural Interstate (2-lanes, TIs every 2 miles)	$15 million/mile	$10,000/mile/year
Major Arterial Street (6-lanes, center left turn)	$4.4 million/mile	$113,000/mile/year
Rural County Road (2-lane?, principal arterial)	$2.1 million/mile	$49,900/mile/year
Tribal Road (2-lanes)	$750,000/mile	$113,000/mile/year
Light Rail Transit (Phoenix 20-mile system)	$50 million/mile	$25 million/mile
Regional Express Bus	$325,000/45 passenger bus	$250,000/bus $5.00/revenue mile
HOV Lane (Urban Freeway)	$5 million/mile	$5,000/mile/year
Local Fixed Route Transit (Typical urban corridor)	$320,000/40-passenger bus	$225,000/year $4.14/revenue mile
Urban Commuter Rail (Maricopa County Region)	$170 million/mile	$6 million/mile
Electric Passenger Rail (Phoenix to Tucson)	$1,200 million/128 miles	Total Cost: $140,423,000 Total Farebox Recovery: $102,784,000 Deficit: $43,745,000
High Speed Maglev Rail (Phoenix to Tucson)	$3 billion/100 miles	$32 million (3 cars per train, 5,000 daily ridership)
Dial-a-Ride (Typical urban route)	$60,000/11-passenger van	$37.18/revenue mile
Vanpool (Typical urban route)	$23,000/8 to 10 passenger van	$16.94/revenue mile
Jitney Van (Typical rural system)	$2.5 – $2.8 million/system	$23,709/vehicle
Regional Bike Path (Urban-Non-motorized)	$527,000/2.3 mile path	$20,000/year

Sources: American Magline Group, ADOT, BIA, MAG, Oro Valley, PAG, RPTA

- The Vision 21 Revenue Consultant estimates that the 20-year comprehensive transportation revenues for Arizona will be $41 billion. All project revenues estimates were developed using 2000 dollars to reduce uncertainty associated with fluctuating inflation rates. The following table includes Federal, State and local sources.

Table 1-3-12

Projected Existing Transportation Revenue Sources

Mode	FY2001-05	FY2006-11	FY2011-15	FY2016-20	Total
Roadway	$7,955.1	$8,432.6	$8,580.1	$8,816.0	$33,783.8
Transit	$1,133.0	$1,050.9	$986.8	$935.1	$4,106.1
Aviation	$846.7	$795.5	$771.0	$751.1	$3,164.3
Total	**$9,935.1**	**$10,279.0**	**$10,337.9**	**$10,502.3**	**$41,054.3**

Source: Wilbur Smith Associates. All figures in millions of dollars.

Roads and Highways

A thorough review of current transportation programs and long-range transportation plans indicates that current revenue sources will be insufficient to meet projected population growth and transportation demands over the next 20 years, despite additional federal and local revenue sources becoming available in recent years.

- Recent ADOT Highway Performance Measurement Studies (HPMS) of Arizona's highways, indicate that there is a $1.75 billion (20-year) backlog in bringing rural highways up to "minimally acceptable" standards. The studies indicate that there is a $728 million backlog (20-year) to bring urban highways up to "minimally acceptable" standards.[36]

- ADOT studies indicate that state highway pavement preservation expenditures should be increased by $15 million per year and annual maintenance expenditures should be increased by $20 million. The 20-year cost of these increases is $700 million.[11]

- A conservative analysis of the Task Force's Needs database indicates that over $9 billion is needed in the next 20 years to properly fund major improvements (reconstruction and widening projects) on the key statewide highway corridors.[3,11]

- The updated 1997 County Needs Assessment indicates that projected county roadway needs exceed expected revenue by $5.1 billion over the next 20 years.[37]

- The build-out cost of HOV lanes, Park & Ride Lots, quadruple express bus service and to expand vanpooling significantly in the metropolitan Phoenix area is approximately $1 billion over the next 20 years.[32]

- The estimated 20 year costs of the MAG Long-Range Plan exceed expected revenues by $9.4 billion.[7]

- In Phoenix, the total street and freeway needs exceed expected revenues by $1.753 billion and the total public transportation needs exceed expected revenues by $3.299 billion over the next 20 years.[35]

- The estimated 20 year cost of the PAG Long-Range Transportation Plan exceed expected revenues by $5.3 billion.[8]

- Several major bypass routes have been identified with substantial costs including Wickenburg ($230 million), Gold Canyon in north-east Pinal County ($150 million), and Tucson – Sauharita ($300 million).[11]

Ongoing maintenance and repair of the 155-mile Maricopa Regional Freeway System will compete with other existing highway segments for scarce maintenance dollars.

- The voter-approved, 20 year Maricopa County transportation sales tax is projected to provide a total of $3.845 billion (inflation adjusted dollars). Based on the 1985 ballot proposition, these revenues are restricted to construction purposes and none of these tax revenues can be used for maintenance or preservation costs. This tax is scheduled to end December 31, 2005.[38]

- Historically, maintenance has not been funded at the long-term optimal levels. An additional $20 million per year is needed to reach optimal levels.[11]

Typically, it takes 15 to 20 years or more to allocate sufficient resources to complete major widening projects (typically to four-lanes) on some of the state's major rural highways.

- It took 31 years to fully fund the widening of the Beeline Highway to four lanes from Phoenix to Payson.

- The projected cost to add another lane in each direction on Interstate 10 between Phoenix and Tucson is about $255 to $350 million, not including upgrades to numerous interchanges that will be needed over the next 20 years. Under current revenues, adding another lane in each direction on this stretch of interstate could take more than 30 years to complete.[11,27]

- Under current revenues, it will take approximately 25 years or more to add an additional lane in each direction on Interstate 17 from the Loop 101 to Cordes Junction. The estimated cost to add one lane in each direction on this stretch of interstate is $125 million.[11,27]

- Over the last seven years, ADOT has spent over $100 million to widen US 93 to four lanes between Kingman and Phoenix. At least $500 million in additional funding is needed to complete this project. Under existing revenues, it will take over 30 years to complete expansion of US 93 into a four-lane highway.[11,27]

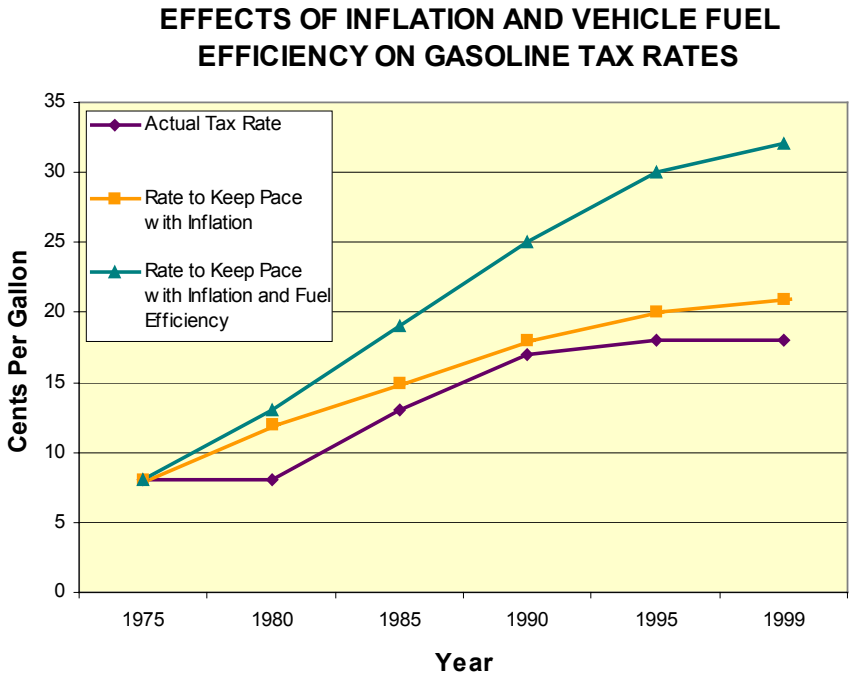
- Based on current revenue sources, the 40 mile segment of SR 85 between Gila Bend and Buckeye will not be fully funded until 2011.[11]

Monies in the Highway User Revenue Fund (HURF) are constitutionally restricted principally to roadway and bridge purposes. HURF revenues have become less effective in fully meeting Arizona's growing transportation needs. Factors, such as inflation, improved fuel efficiency, and the increasing use of non-taxed fuel sources, have and will continue to erode the effective yield of Highway User revenues.

- Currently, the State's fuel tax on gasoline and diesel fuel generates approximately 56% of total Highway User Revenue Fund (HURF) revenues. The HURF revenues support 62% of total roadway costs in the State (Wilbur Smith Associates). The use of HURF revenues is restricted by the Arizona Constitution (Article IX, Section 14), primarily to road and bridge improvements and maintenance.[38]

- The following graph illustrates increases in the gasoline taxes that would have been necessary to offset the effects of inflation and vehicle fuel efficiency on gasoline tax collections:

Figure 1-3-3



Source: Wilbur Smith Associates

- Ford, Honda, GM and other auto manufactures are selling hybrid-drive vehicles that get 70 to 80 miles per gallon. Major auto manufactures are taking steps to improve the fuel efficiency of sport utility vehicles by 35%. High vehicle fuel efficiency reduces the tax revenues received per mile of travel, but does not similarly reduce the costs of developing and maintaining the transportation system.

- As auto manufacturers begin to mass produce fuel cells and alternatively fueled vehicles, Arizona, the other states, and the federal government will have to modify their existing fuel tax structure or identify non-fuel revenue sources to adequately fund future transportation improvements, maintenance and services.

- According to the Federal Highway Administration, the federal 4-cent per gallon tax break provided for ethanol fuels costs Arizona approximately $8 million each year. In Arizona, alternative fuel vehicles are exempt from the state's 18-cent per gallon fuel tax. These vehicles are also assessed only a minimal vehicle license tax. The full financial impact of these tax breaks on the HURF each year is uncertain. As of May 2000 there were over 13,000 alternative vehicles, including governmental fleets, registered in this state.[38,39]

Growing congestion, time delays, and safety are common transportation concerns in both urban and rural communities. Among the key rural transportation needs are growing demand for para-transit services, congestion relief where local roads intersect with state highways, additional highway shoulders, safety pullouts, passing lanes, and bypass routes.

- Approximately 37 miles of passing and climbing lanes have been constructed by ADOT in FY 1999 through FY 2001 at a cost of $24.3 million.[3] Exhibit Q contains a listing of these projects.

- The following chart indicates the projected costs to construct some of the various bypass routes that have been requested by communities throughout Arizona.

Table 1-3-13

Bypass Route Costs

Community	Impacted Highway	Projected Cost	Length
Apache Junction (Gold Canyon)	US60	$150 million	18 miles
Gila Bend	I-8, SR85	$24 million	4 miles
Kingman (Wickieup)	US93	$46 million	4 miles
Payson	SR87/SR260	$70 million	8 miles
Tucson – Sauharita	I-10, I-19	$300 million	19 miles
Wickenburg (permanent bypass)	US60	$230 million	25 miles

Source: ADOT State Engineer's Office

- Currently, there are 4,274 miles of two-lane highways under ADOT's jurisdiction. According to ADOT, 60% of these two-lane highways were built over 50 years ago to narrower lane and shoulder width standards.[11]

Transit

Beginning in the late 1990's cities moved to fund transportation projects, especially transit services, through local tax referenda. While successful passage of these local tax elections may help meet municipal needs , they do not address regional transportation facilities or services.

- **Tempe Transit Tax:** In September 1996, Tempe voters approved a permanent ½% sales tax dedicated to public transit improvements. A fifteen member citizens' Transportation Commission was formed to provide citizen oversight of the tax, among other responsibilities. The average annual transit tax revenues are approximately $24,000,000. These revenues are used to support a variety of transit, bicycle and pedestrian capital projects including bus stop improvements and bus pullouts, transit centers and maintenance facilities, light rail planning and construction, and bikepaths. The following is a summary of how these revenues (in constant 2000 dollars) will be allocated over the 20-year life of the tax:

Table 1-3-14

Tempe Transit Tax Uses

Service or Improvement	20-Year Total	% of Total Revenue
Local Bus Service	$341 million	41%
Light Rail Rapid Transit	$129 million	16%
Dial-a-Ride Service	$33 million	4%
Bus Rapid Transit (Express Bus)	See note below	--
Support Services e.g. transit security	$168 million	20%
Limited Stop Service	N/A	N/A
Neighborhood Mini-Bus Service	$108 million	13%
Other Improvements e.g. bus pullouts	$53 million	6%

Note: Tempe does not currently have plans for BRT service, although it is being discussed as an alternative in the Tempe/Scottsdale Major Investment Study currently underway.

Source: City of Tempe

•**Phoenix Transit 2000 Plan:** In March 2000, Phoenix voters approved a 4/10th% sales tax to fund various transit improvements or services. The following is a summary of how these revenues (in constant 2000 dollars) will be allocated over the 20-year life of the tax:

Table 1-3-15

Phoenix Transit Tax Uses

Service or Improvement	20-Year Total	% of Total Revenue
Local Bus Service	$2.515 billion	52%
Light Rail Rapid Transit	$1.654 billion	34%
Dial-a-Ride Service	$336 million	6%
Bus Rapid Transit (Express Bus)	$160 million	4%
Support Services e.g. transit security	$115 million	2%
Limited Stop Service	$61 million	1%
Neighborhood Mini-Bus Service	$54 million	1%
Other Improvements e.g. bus pullouts	$44 million	1%

Source: "Transit 2000 – the Phoenix Transit Plan Summary " City of Phoenix Public Transit Department, March 2000.

•**Flagstaff Transportation Tax:** In May 2000, Flagstaff voters approved several components of a new transportation sales tax. The new revenues are dedicated to specific transportation improvements including a railroad overpass, street improvements and transit system improvements. The sales tax is expected to generate approximately $121 million over the 20-year life of the tax. The sales taxes will be used to fund the following four transportation projects and services:

Table 1-3-16

Flagstaff Transportation Tax Uses

Project or Service	20-year Total
Fourth Street Overpass	$27.6 million
Pedestrian/Bike Path Projects	$16.0 million
Street Improvements & Maintenance (including computerized signal synchronization)	$52.0 million
Transit –expanded bus system	$14.0 million

Source: "Transportation 2000 Decision", City of Flagstaff

•**Glendale Transportation Sales Tax:** In November 2000, Glendale voters approved a ½% sales tax for transportation purposes, from 2002 to 2025. The $1 billion plan includes anticipated federal, regional and state funding, farebox revenues and city revenues. The ½% tax is expected to cover 58% of the plan. The following is how the Citizens Advisory Committee Transportation Issues believes these local tax revenues should be spent:

Table 1-3-17

Glendale Transportation Tax Uses

Service or Improvement	23-Year Total	% of Total Revenue
Local Bus Service	$340 million	34%
Street Improvements	$310 million	31%
Light Rail Rapid Transit	$170 million	17%
Dial-a-Ride Service	$80 million	8%
Support Services e.g. transit security	$60 million	6%
Other Modes e.g. bicycle	$40 million	4%

Source: "Transportation Package Needs More Specifics" Glendale Star, June 21, 2001.

- **Tucson:** A Citizens Advisory Committee has been formed to develop a plan on how to spend a potential ½% city sales tax over the next 20 years. The ½% sales tax is expected to generate approximately $40 million per year. The Advisory Committee is expected to forward its recommendations to the Tucson City Council by early December 2001.

Intercity Passenger Rail

Intercity passenger rail service between Phoenix and Tucson does not appear to be a cost-effective means of relieving congestion compared to building an additional lane in each direction on this heavily-utilized interstate.

- Traffic trends show a need to widen Interstate 10 between Phoenix and Tucson to a total of six lanes by 2005 and to a total of eight lanes by 2020.[17]

- A 1997 ADOT study evaluated various alternative means to alleviate growing congestion on the Interstate 10 corridor between Phoenix and Tucson. The following is a comparison of the five major alternatives evaluated in the ADOT study.[17]

Table 1-3-18

I –10 Alternatives

Alternative	Top Speed	Travel Time	Capital Costs	Annual Operating Costs	Annual Vehicles or Ridership
Highway Widening* (New lane each way)	75mph	103 minutes	$255 million	$3.20 million	3,213,000
Conventional Rail* (Minor upgrades)	80mph	117 minutes	$378 million	$17.6 million	1,277,500
Conventional Rail* (Major upgrades)	125mph	82 minutes	$1.15 billion	$96.2 million	2,482,000
High Speed Rail* (Electric)	175mph	60 minutes	$3.6 billion	$138 million	3,212,000
High Speed Rail** (Maglev)	300mph	Approx. 39 minutes	$3 billion	$32 million	1,800,000

*Source: *"Arizona High Speed Rail Feasibility Study", Arizona Department of Transportation, April 1998.*
***American Magline Group*

- Building an additional lane in each direction on this stretch of Interstate 10 will cost between $255 million and $350 million, excluding major traffic interchange improvements and would move an additional 3.21 million vehicles per year. The least expensive conventional rail alternative has a capital cost of $378 million and would move only 1.217 million riders per year. High-speed passenger rail (electric) would move a comparable amount of people as adding one more lane in each direction, but at three to four times the cost ($1.15 billion).[17] Additional highway lane capacity will also move substantial amounts of goods and freight in addition to motorists whereas transit tends to move primarily people.

- The following are three examples of passenger or commuter rail systems that link numerous urban centers and are considered to be very successful transit operations based on recent evaluations by the American Public Transit Association[40]:

  Amtrak Cascades: This passenger rail system located in the Pacific Northwest links 16 different communities, including Vancouver, British Columbia; Seattle and Olympia, Washington; and Portland and Eugene, Oregon. In 1999, the average travel time between Portland and Seattle was 3.5 hours. By 2018 travel time between these two metropolitan areas is expected to be 2.5 hours due to newer track and system improvements. The top speed of the Cascade Talgo trains is 79 mph. The average daily ridership is 1,123 persons and the annual total ridership is 410,000 passengers.

  South Shore Line: This 90-mile commuter rail system serves 13 urban communities located along Lake Michigan. Various segments of the system have been in operation since the 1920s. In 1982, a major capital equipment upgrade including the addition of 41 new cars, was completed. In 1992, an additional 17 cars were added. The trains travel at a top speed of 79 mph. The average daily ridership is 9,589 and the total annual ridership is 3.5 million passengers.

Aviation

Historically, federal aviation monies have funded over 80% of the aviation capital improvement projects in Arizona. Rededicating all flight property tax revenues to the State Aviation Fund will enhance the ability of the state and local communities to secure additional federal aviation grants.

- The State Aviation Needs Study (SANS 2000) indicates that $315 million in additional revenues is needed over the next 10 years to maintain existing levels of performance at the 20 commercial service and reliever airports throughout the State.[15]

- The SANS 2000 study also indicates that an additional $649 million in new funding is need to bring these airports up to minimally acceptable guidelines.[15]

- Currently, there are 309 airports in Arizona that are registered with the Federal Aviation Administration (FAA). Eighty-one of these are open to the public and thereby eligible for grants from the State Aviation Fund. Fifty-seven of these facilities are recognized by the FAA as nationally significant airports and are thereby eligible for federal funding for airport planning and capital improvements.[41]

- In 1999, Wilbur Smith Associates completed a study at the request of ADOT and Governor Hull entitled "Airport Small Community Economic Development and Transportation Program" (ASCET). The ASCET study indicates that aviation improvements would enhance economic development, attract and retain employers, and increase tourism in numerous communities throughout Arizona.[18]

Other Modes

- Since 1993, ADOT and the State Transportation Board have allocated nearly $70 million in federal revenues for highway enhancement projects. Over 60% of these revenues or $49 million have been allocated to pedestrian and bikepath projects. An additional $7.35 million in local matching funds have been used to fund these pedestrian and bikepath improvements.

Economic Impact of Transportation

National and state studies clearly indicate the significant <u>direct</u> impact transportation expenditures have on our economy.

Roadway and Highway Construction

- Transportation construction is a $153 billion per year industry in the United States.[44] This industry makes a greater contribution to the Gross Domestic Product than do the nation's farms ($93.9 billion), the petroleum industry ($88.6 billion), the motion picture industry ($31.3 billion) and the tobacco industry ($19 billion).[45]

- Each $1 billion invested in the federal highway program creates a total of 42,100 jobs in three categories: direct, indirect and induced jobs. A $1 billion investment in highways creates 7,000 direct jobs (workers that work directly on highway projects); 19,7000 indirect jobs (workers that help supply materials for highway construction); and 14,500 induced jobs (workers that benefit from the spending of highway construction and supply industry employees).[46]
- The value of highway contracts awarded in August 2001 throughout the country was $3.204 billion.[47] In August 2001, ADOT awarded $100 million in highway contracts.[11]

- In August 2001 approximately $1.3 billion in bridge and tunnel contracts were awarded throughout the country.[47]

Aviation

- In 1999, Arizona State University's College of Business completed an analysis for ADOT of the direct and indirect impact of aviation on Arizona's economy. The following are some of the key findings from the ASU report on aviation's *direct impact* on this State in 1998[42]:

  Aviation's primary impact on Arizona's economy was $15.1 billion in economic activity including 167,325 jobs with a payroll of $4.3 billion.
  The primary impact of Arizona's commercial aviation, as measured by combined revenues of private firms and budgets of government agencies, was $3.8 billion in 1998. Employment directly related to commercial aviation was 29,432 with an annual payroll of $884.1 million.

  Over 10,500 Arizona workers have jobs directly related to general aviation. Economic activity from general aviation aircraft owners and general aviation airports was nearly $1 billion in 1998.

  Arizona's aerospace manufacturing firms produced output valued at $4.4 billion in 1998. These manufacturing firms employed 26,935 workers, with average annual salaries exceeding $50,000.

  Air travelers and tourists spent $4.5 billion in Arizona in 1998, creating 77,000 jobs in lodging, retailing and the service sector.

Transit

- In 1999, Cambridge Systematics prepared a quantitative analysis for the American Public Transit Association on the impact of public transportation on the Nation's economy. The following are some of the key findings from this report[43]:

  Transit capital investment is a significant source of job creation. An estimated 314 jobs are created for each $10 million invested in transit capital improvements.

  Local businesses benefit from transit operations. The analysis indicates that a $10 million investment in transit results in a $30 million gain in sales.

Transportation Planning and Programming Issues

Development of a 20-Year State Transportation Plan

Arizona needs an integrated long-range (at least 20 years) transportation plan. A 20-year plan will identify the State's critical transportation needs. The Plan should include all modes of transportation including roadway, rail, transit, air, bicycle, pedestrian, and freight as well as alternatives including travel reduction programs and telecommunications.

- ADOT is required, by law, to establish a 20-year Highway Construction Plan by July 1, 2003. Although ADOT is developing a 20-year multimodal plan, state law only requires a 20-year state highway plan.

- Currently, ADOT and the State Transportation Board annually develop and approve a rolling 5-year highway construction program. While this process is effective for identifying and addressing short-term needs, it creates false expectations that some highway projects may be funded in the sixth year or the next 5-year program. A 20-year plan will more reliably identify the time period during which major highway corridor improvements can be expected to be funded under current revenue projections. Additionally, the State's transportation needs and expected revenues will be more clearly identified.

Performance Based Planning and Programming

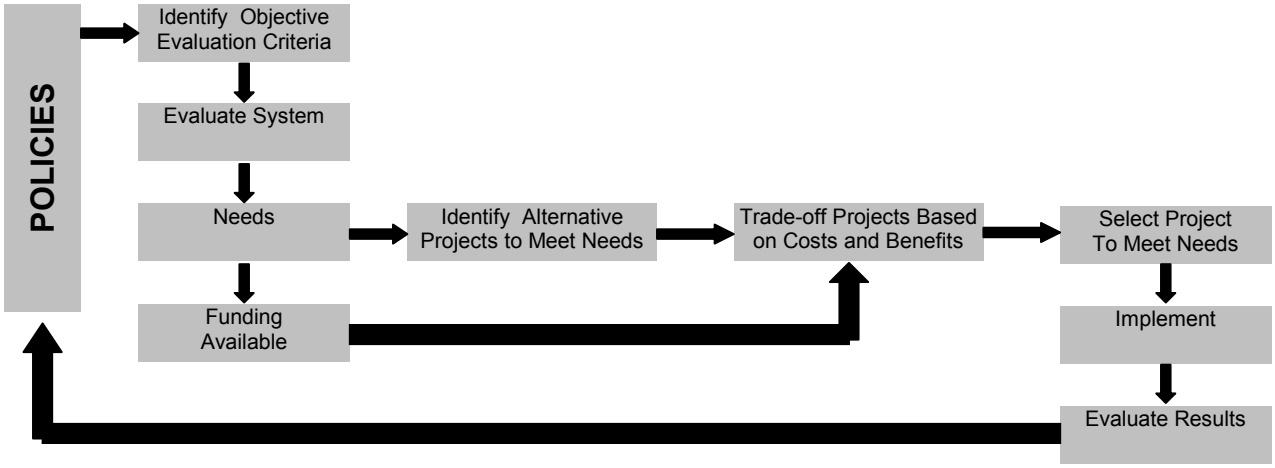
Performance based planning and programming is being used effectively in other states to maximize the effectiveness of limited transportation resources.

- Current state, local and regional transportation plans include very little data concerning the expected impact of specific projects and resource allocations on the performance of the local, regional or state transportation systems. Transportation agencies elsewhere have improved the positive correlation among resource allocations, system improvements, and the performance of the overall transportation system by using performance based processes.[48]

- Colorado, Florida, Montana and Washington have implemented performance based planning and programming.[49] While each state has implemented this type of project prioritization and evaluation process differently, the following flow chart illustrates some of the common elements of performance based planning and programming[3]:

Figure 1-3-4

Performance Based Planning



- New analytical computer models have been developed by the U.S. Department of Transportation to enable transportation planners and policy makers to evaluate potential performance outcomes of competing transportation system improvements within a particular corridor. For example, the Surface Transportation Efficiency Analysis Model (STEAM) compares alternative capital projects (e.g. mixed-flow freeway lane, HOV lane and rail extension). STEAM generates various outputs including travel-time savings, vehicle emissions, energy costs and benefit/cost ratios. Another model, known as the Intelligent Transportation System Deployment, can estimate the impacts, benefits and costs from the deployment of various ITS components.[49]

- For years ADOT has utilized performance based planning and programming to select and fund pavement preservations projects.

Standardized Transportation Data Collection and Reporting

There is a lack of verifiable and standardized data to measure how effectively transportation improvements and services are meeting our State's existing and future transportation needs.

- Federal law requires Metropolitan Planning Organizations (MPOs) to develop fiscally constrained long-range transportation plans. However, existing MPO plans within Arizona typically do not clearly identify which services or improvements can be funded by existing revenue sources and which cannot be completed without tax increases.

- MPOs and Councils of Governments (COGs) collect and report data in significantly different ways. Disparities among MPOs and COGs exist because of differences in available funding, expertise, and support for data collection activities. In recent years, ADOT has developed Geographic Information System (GIS)-based data collection software for use by the MPOs and COGs. Use of the software will assure both the quality and consistency of collecting transportation data on a statewide basis.[7,8]

- ADOT and regional planning entities have worked cooperatively in recent years to improve the planning and programming process, through efforts such as the "Casa Grande Resolves". Nevertheless, available transportation data and information varies widely by jurisdiction, thereby making it very difficult to perform any statewide analysis or assessment of our State's transportation system.

Transportation and Land Use Planning

There is a distinct gap in the coordination of land use plans among state, local and regional transportation plans.

- Municipalities or counties are not required to report major amendments to their general use or comprehensive land use plans to appropriate transportation agencies or organizations.

- Existing statutes only require municipalities and counties to consider impacts of proposed changes on adjacent communities and infrastructure. They are not required to consider the impacts to a region's overall transportation system, when developing land use plans or approving developments.

- Local and county governments often fail to limit development along state highway bypass routes, thereby eroding their effectiveness and creating the need for additional, costly bypass routes.

- Frequently, cities and counties are pressured by homeowners associations, businesses or developers to ignore adopted regional guidelines governing corridor preservation, access control standards and traffic light spacing on routes of regional significance. Failure to adhere to these guidelines adversely impacts traffic flows along these designated corridors and creates congestion and traffic delays.

- The Arizona Legislature has enacted legislation, in recent years, to help protect commercial service and military airports from adjacent development. However, there is no regional entity or legal mechanism to modify airport operations or to ensure that local or county

land use plans do not adversely impact airports or air space corridors.

Casa Grande Resolves

Federal, state and regional transportation officials have worked to streamline transportation planning and programming processes and to improve communication and cooperation among these various agencies.

- In the spring of 1999, representatives of ADOT, the Federal Highway Administration (HWA), MPOs and COGs throughout Arizona met in Casa Grande to discuss and develop a new statewide transportation planning and programming process. The group adopted a document known as the "Casa Grande Resolves", which outlines seven guiding principles for better transportation planning and programming. These seven guiding principles are listed below.

  There will be one multimodal transportation planning process for each region that is *seamless to the public* which includes *early and regular dialogue and interaction* at the state and regional level and recognizes the needs of state, local and tribal governments and regional organizations.

  It will be a process that encourages *early and frequent public participation and stakeholder involvement* and that meets the requirements of the Transportation Equity Act for the 21st Century (TEA-21) and other state and federal planning requirements.

  The policy and transportation objectives of the state, regional and local plans will form the foundation for the statewide Long-Range Transportation Plan (20 years).

  The statewide Five-Year Transportation Plan and Programs will be based on clearly defined and agreed to information and assumptions including there sources available, performance measures, and other technical information.

  Each project programmed (within the Five-Year Plan) *shall be linked to the statewide Long-Range Transportation Plan* with each project selected to achieve one or more of the Plan objectives. The program will represent an equitable allocation of resources.

  Implementation of the Plan and Program shall be monitored using a *common database* of regularly updated program information and allocations.

  There will *be a shared responsibility* by state, local and tribal governments and regional organizations to ensure that Plan and Program implementation meets the transportation needs of the people of Arizona.

- Among other changes, the 1999 meeting led to the creation of a Resource Allocation Advisory Committee (RAAC) to help develop policies and annual recommendations regarding the allocations of ADOT's discretionary funding.

Arizona Transportation Information System

New computer technology (e.g., Highway Performance Measurement Systems) have made it feasible for the State to develop an affordable and comprehensive transportation database to inventory and monitor state, county, local and tribal roadway systems.

- Over the last five years ADOT has been developing and implementing the Arizona Transportation Information System (ATIS) to enable the State to maintain a geographic information system (GIS) database and photo log of all major highways, streets and roads throughout the state.[50]

- ATIS is used to assist in the collection of Highway Performance Measurement System data, thereby providing a core set of information for all public roads. Certified public mileage and responsible jurisdiction, estimated traffic counts and vehicle miles traveled, function classification or degree of regional significance, roadway surface type, roadway surface condition, and number of lanes are among the data collected.[50]

- Data and photo logs for the over 6,600 miles of state highways has been entered into the ATIS. However, the data and photo logs for county,

local and tribal roads have not been entered due to limited funding and the fact that these jurisdictions submit this information voluntarily. Tribal roadways could be included in the database, if the tribes collected and submitted the required data.[50]

- The entire ATIS database, including photo logs, could be completed and updated for approximately $600,000 per year for five years. Thereafter, the projected cost to maintain the system is about $300,000 per year.[50]

Transportation Governance Issues

State Transportation Board

Some provisions in state law dealing with the State Transportation Board are outdated and limit the ability of growing urban and rural communities to submit viable candidates for the Governor's consideration.

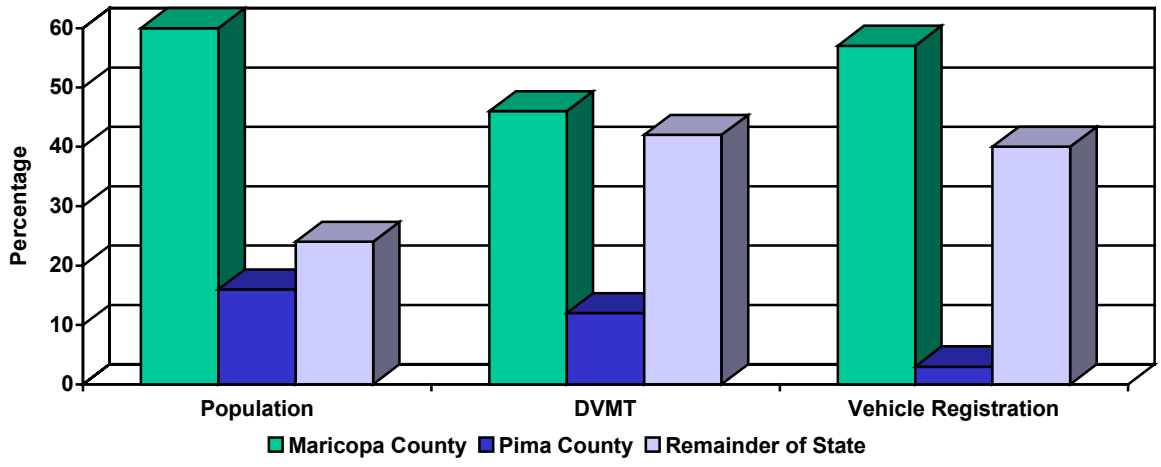
- ARS 28-301 divides the State into six transportation districts and provides for the appointment of one Transportation Board member from each district, except two are appointed from the Maricopa County district. Some districts cover just one county and one district is comprised of four counties. The boundaries of the current six districts were created by legislation over 20 years ago.

- ARS 28-302 requires the Governor to rotate the appointment of board members from multi-county districts, among the counties in the district. Some growing urban areas must wait long periods of time before a resident of their county can be considered for appointment. For example, District 6 covers four counties: La Paz, Mohave, Yavapai and Yuma. Under current law, these counties can only have direct representation on the State Transportation Board every 18 years. There is concern that this antiquated requirement fosters parochialism regarding what projects are included in the State's Five-Year Highway Construction Program.

- Under current law, only two of the seven members (29%) of the State Transportation Board come from Maricopa County, even though 60% of Arizona's total population, 45% of statewide daily VMT, and 55% of all registered vehicles are in Maricopa County. The graph below illustrates the percentage of population, daily VMT and registered vehicles for Maricopa County, Pima County and the remainder of the State.

Figure 1-3-5

Percentage of Population, DVMT and Registered Vehicles



Source: Arizona Department of Economic Security, ADOT Data Center and Arizona Department of Motor Vehicles

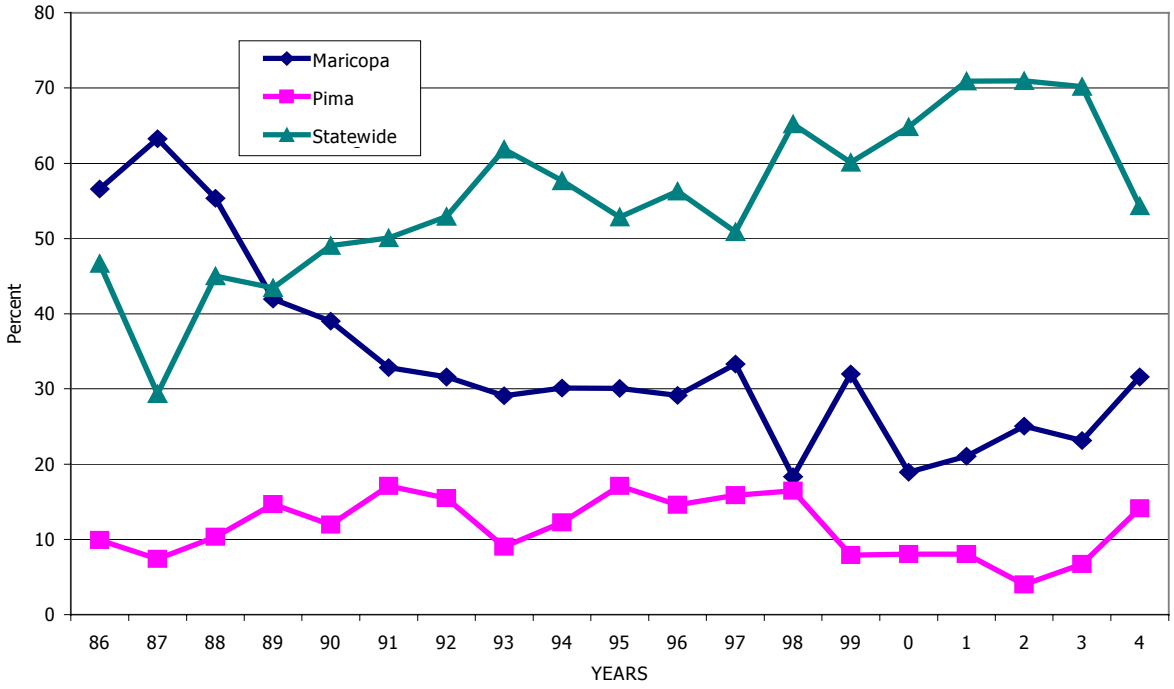
Following the passage of the ½% freeway sales tax in Maricopa County in 1985, ADOT and the State Transportation Board shifted more of ADOT's discretionary monies to make major improvements on several key rural highways.

- Prior to 1985, approximately 60% of ADOT's discretionary funding went to major improvements on highways within the Maricopa County region. From 1986 through 1999, the percentage of annual ADOT discretionary funding allocated to this region steadily declined. According to some estimates only 19% was allocated to the Maricopa County region in 1998.[3] The graph the following page illustrates the steady decline in ADOT discretionary funding to the Maricopa County region.

- This shift in allocation of ADOT's discretionary funding over this 13-year period, enabled ADOT and the State Transportation Board to program major improvements on several key rural highways, such as SR 90, the Beeline Highway and US 93.

Figure 1-3-6

ADOT Allocation of State and Federal Funds by Region



Source: Arizona Department of Transportation Planning Division

Regional Planning Organizations

Mayors elected from individual cities control the Metropolitan Planning Organizations within the State. This structure establishes an inherent conflict between the regional responsibilities of the MPO and the local responsibilities of each mayor. Locally elected mayors are obligated to represent the best interests of their constituents and most act accordingly. Therefore, regional plans and priorities are frequently evaluated on the basis of local impacts, rather than regional consequences.

- Public input consistently reaffirmed that Arizona's citizens want a seamless transportation system that moves people, goods and services in an efficient manner. In general, the Task Force found that state or local entities do an acceptable job in terms of providing adequate transportation within their respective jurisdictions, but there is a significant lack of coordination of regional transportation system needs. The following are specific examples where some regions have not properly prioritized or implemented sound, regional transportation policies or programs:

  Regionally significant corridors that have been identified but the rights-of way have not been systematically preserved;
  Regional aviation plans that properly utilize existing airport facilities and adequately address critical airspace and land use issues have not been established or implemented;

  Regional traffic light synchronization and the utilization of "real-time" adaptive traffic signal technology have not been given a high priority by some jurisdictions;

  Proposed guidelines limiting the installation of traffic signals to one-mile and half-mile streets that intersect "roads of regional significance" have not been enforced;

  Available federal, state and local monies have not been utilized, to any great extent, to provide adequate regional express bus or bus rapid transit service;

  The expansion of regional vanpool service has not been adequately funded in the Phoenix metropolitan area, despite 100% farebox recovery on the operating costs of each van; and

  Reliable dial-a-ride service has not been developed throughout the large urban areas.

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Exhibit A

Arizona Cities, Towns and Counties Population

City	1990	2000	2010	2020
Phoenix	983,392	1,249,450	1,544,093	1,795,539
Tucson	405,371	485,790	540,307	589,899
Mesa	288,104	388,185	540,608	593,962
Glendale	147,864	211,555	260,561	305,164
Scottsdale	130,075	207,145	270,763	306,713
Chandler	89,862	176,970	221,664	258,915
Tempe	141,993	162,000	174,769	183,466
Gilbert	29,122	108,745	174,690	244,842
Peoria	50,675	108,295	141,185	183,815
Yuma	56,966	73,260	81,836	99,337
Flagstaff	45,857	62,710	71,981	81,972
Sierra Vista	32,983	40,830	46,642	52,571
Prescott	26,592	36,975	42,272	49,863
Surprise	7,122	32,815	41,278	60,955
Bullhead City	21,951	30,789	28,144	53,848
Oro Valley	6,670	29,530	44,190	59,388
Avondale	16,169	28,280	37,499	84,788
Casa Grande	19,076	26,490	25,751	28,275
Apache Junction	18,092	25,880	25,957	28,718
Prescott Valley	8,904	23,285	35,776	46,365
Nogales	19,489	21,810	24,282	27,782
Kingman	12,722	20,790	25,225	29,277
Goodyear	6,258	19,695	38,082	92,579
Fountain Hills	10,030	19,105	34,585	54,632
Douglas	13,137	17,295	16,252	16,458
San Luis	4,212	16,465	16,976	20,517
Marana	2,187	15,185	46,078	76,553
Payson	8,377	13,665	17,427	21,297
Paradise Valley	11,773	13,395	13,375	13,418
Winslow	9,279	11,395	12,249	13,007
Eloy	7,211	10,970	10,651	11,562
Sedona	7,720	10,265	12,380	14,611
Safford	7,359	9,870	12,569	13,473
Page	6,598	9,570	11,128	13,057
Camp Verde	6,243	8,955	11,407	14,068
Show Low	5,020	8,575	8,832	9,742
Globe	6,062	8,145	8,107	8,661
Buckeye	4,436	8,000	28,144	82,384
Chino Valley	4,837	7,810	10,445	12,771
Coolidge	6,934	7,520	7,551	7,784
Cottonwood	5,918	7,167	10,749	15,246
Somerton	5,282	6,729	8,224	9,872
Bisbee	6,288	6,590	6,676	6,692
El Mirage	5,001	5,845	5,927	7,273
South Tucson	5,171	5,803	6,474	7,151
Holbrook	4,686	5,653	6,066	6,354
Guadalupe	5,458	5,495	5,720	5,732
Wickenburg	4,515	5,175	9,491	10,556
Eagar	4,025	4,979	6,024	7,182
Litchfield Park	3,303	4,840	8,452	14,688

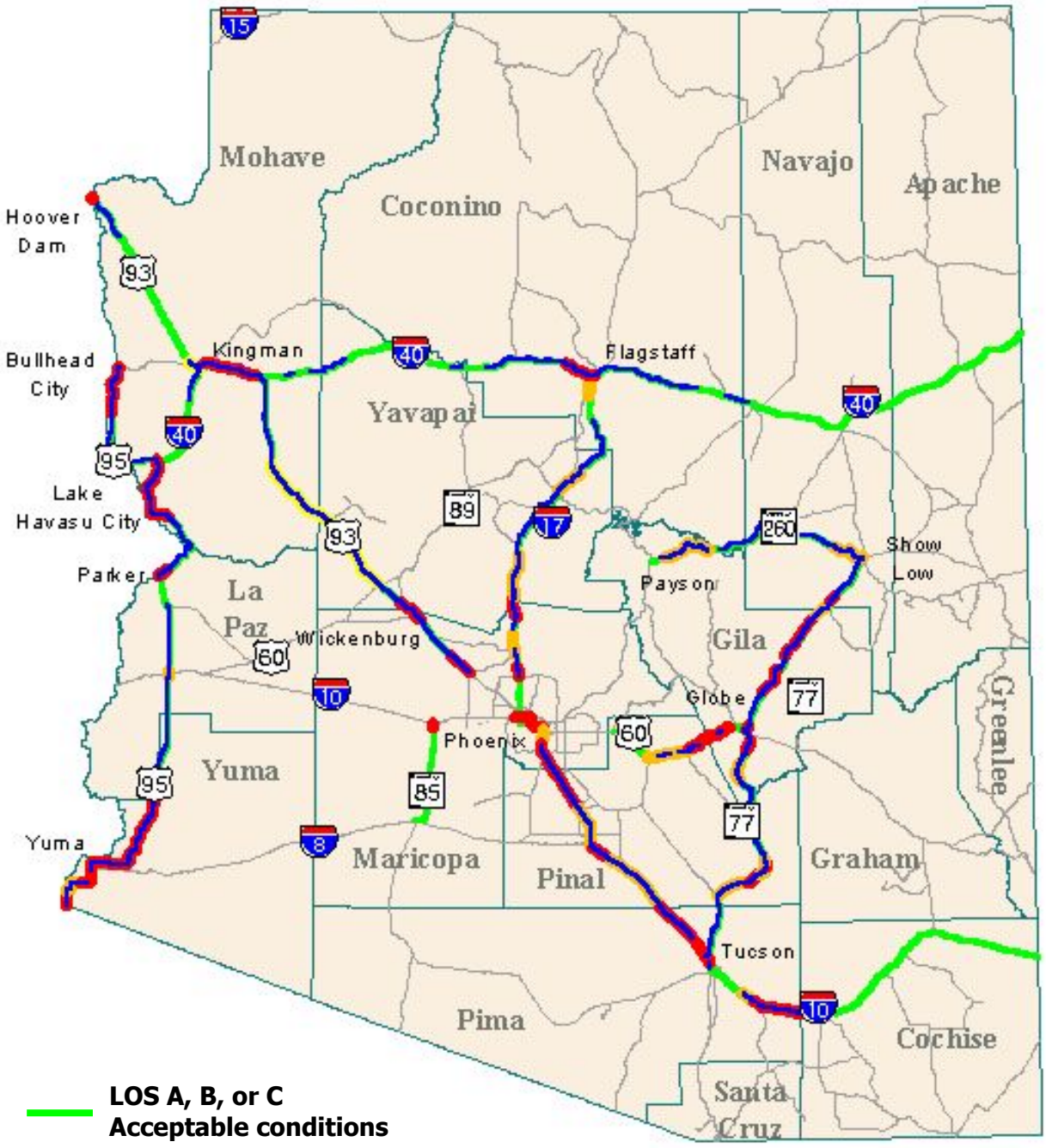
City	1990	2000	2010	2020
Snowflake	3,679	4,495	4,888	5,143
Tolleson	4,434	4,465	6,897	8,207
Queen Creek	2,667	4,455	13,965	20,505
Benson	3,824	4,329	4,472	4,499
Thatcher	3,763	4,303	5,036	5,763
Colorado City	2,426	4,150	5,500	6,626
Cave Creek	2,925	3,955	8,981	12,579
Willcox	3,122	3,750	3,914	3,944
Pinetop-Lakeside	2,422	3,688	4,090	4,193
Superior	3,468	3,511	3,568	3,616
St. Johns	3,294	3,431	3,517	3,538
Clifton	2,840	3,087	3,278	3,507
Parker	2,897	3,053	3,820	4,818
Clarkdale	2,144	3,040	3,932	4,786
Sahuarita	1,629	2,959	6,491	10,564
Taylor	2,418	2,923	3,431	4,019
Williams	2,532	2,912	3,310	3,601
Carefree	1,657	2,910	4,611	5,384
Youngtown	2,542	2,740	2,875	3,032
Kearny	2,262	2,610	2,903	3,146
Quartzsite	1,876	2,239	3,668	5,498
Pima	1,725	2,122	2,422	2,669
Miami	2,018	2,066	2,094	2,127
Huachuca City	1,782	2,065	2,229	2,362
Springerville	1,802	2,035	2,338	2,663
Mammoth	1,845	2,020	2,108	2,180
Gila Bend	1,747	1,840	2,387	2,695
Tombstone	1,220	1,512	1,595	1,611
Fredonia	1,207	1,349	1,507	1,671
Wellton	1,066	1,237	1,415	1,610
Patagonia	888	983	1,022	1,033
Hayden	909	911	912	913
Duncan	662	816	888	949
Jerome	403	596	686	772
Winkelman	676	419	422	425
County	**1990**	**2000**	**2010**	**2020**
Maricopa	2,122,101	2,991,250	3,709,566	4,516,090
Pima	666,957	866,125	1,031,623	1,206,244
Pinal	116,397	169,475	199,715	231,229
Yavapai	107,714	160,075	198,052	240,849
Mohave	93,497	145,425	194,403	236,396
Cochise	97,624	126,300	137,035	149,990
Coconino	96,591	124,575	147,352	169,343
Navajo	77,674	95,300	99,979	111,946
Apache	61,591	67,725	76,645	85,766
Gila	40,216	51,175	54,603	60,757
Santa Cruz	29,676	40,075	46,246	55,111
Graham	26,554	36,350	43,499	50,673
La Paz	13,844	19,350	25,096	29,078
Greenlee	8,008	9,325	9,605	10,271
Yuma	106,895	142,750	171,689	209,861

Source: Arizona Department of Economic Security

Please note that population figures represent estimates prior to adjustment for 2000 census.

Exhibit B

Level of Service for the State



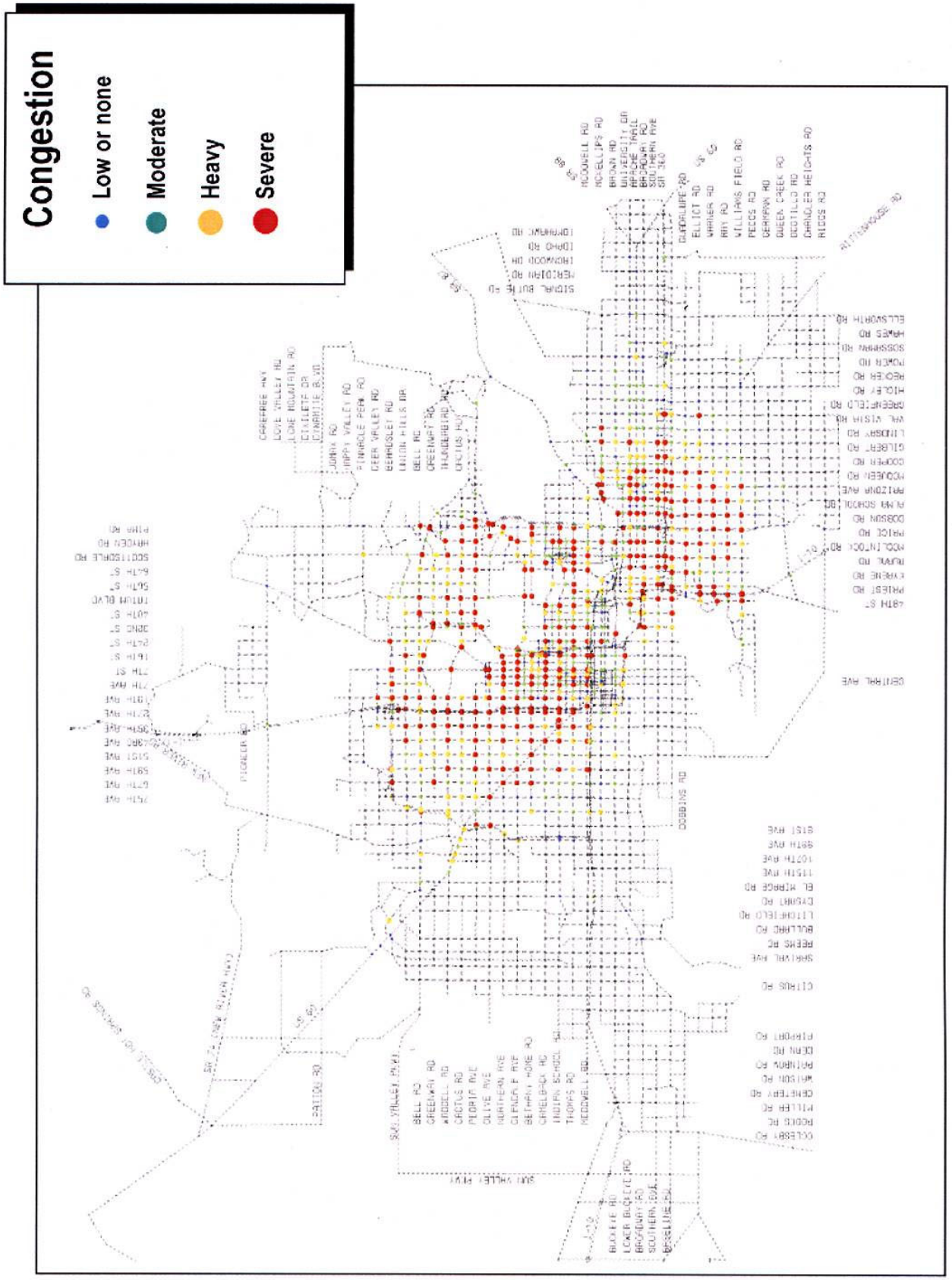
LOS A, B, or C
Acceptable conditions

LOS D
Deteriorating conditions

LOS E and F
Congested conditions

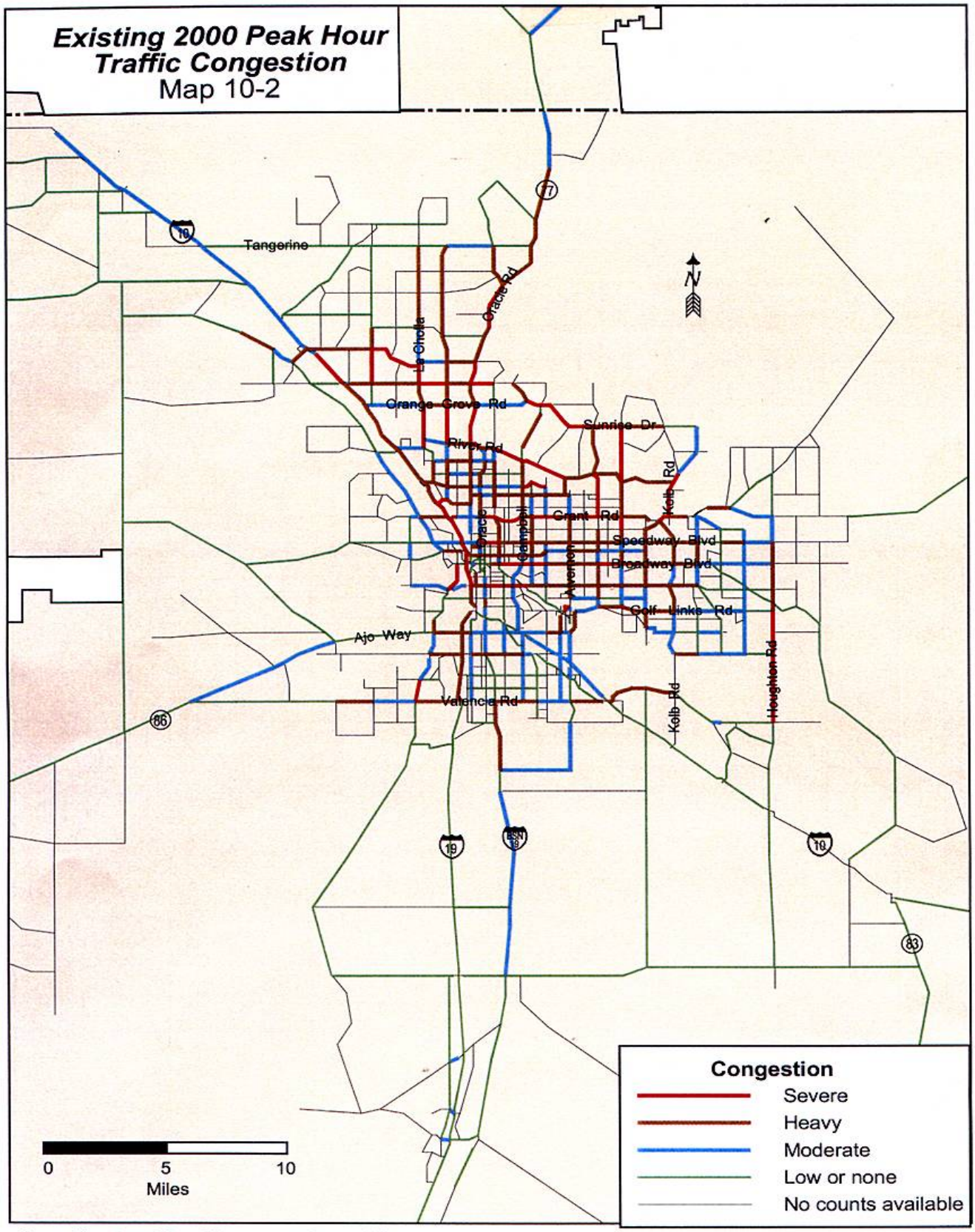
Source: Booz-Allen Hamilton Final Report

Exhibit C



Source: Maricopa Association of Governments, April 2000

Exhibit D



Source: Pima Association of Governments, January 2001

Exhibit E

Sample of Heavily Congested Roadways & Intersections

Central Valley

Scottsdale Road - from Bell Road to the Red Mountain Freeway
Hayden Road - from Red Mountain Freeway to Greenway Road
Bell Road - from Scottsdale Road to 59th Avenue
Lincoln Drive - from 7th Street to Scottsdale Road
Shea Blvd. - from 40th Street to Pima Road
Glendale Avenue - from 7th Street to the Agua Fria Freeway
Northern Avenue - from SR 51 to 59th Avenue
Camelback Road - from 44th Street to 35th Avenue
Indian School Road - from 7th Street to 59th Avenue
Baseline Road - from 40th Street to Interstate 10
Elliot Road - from 48th Street to Interstate 10
Warner Road - from 48th Street to Interstate 10

West Valley

19th Avenue - from Maricopa Freeway to the Agua Fria Freeway
59th Avenue - from Interstate 10 to the Agua Fria Freeway
Grand Avenue - from 19 th Avenue to Bell Road
75th Avenue - North and South of the Agua Fria Freeway
59th Avenue - from Agua Fria Freeway to Interstate 10
35th Avenue - from Bell Road to Van Buren Street
19th Avenue - from Agua Fria Freeway to the Maricopa Freeway
Bell Road - from 59th Avenue to 7th Avenue
Union Hills - from 43rd Avenue to 7th Avenue
Olive/Dunlap Road - from 59th Avenue to 7th Avenue
Peoria Avenue - from 59th Avenue to 19th Avenue
Glendale Avenue - from 51st Avenue to 7th Avenue
Northern Avenue - from 59th Avenue to State Route 51 (the Squaw Peak Freeway)
Indian School Road - from 59th Avenue to 19th Avenue

East Valley

Guadalupe Road - from Alma School Road to Country Club Avenue
Gilbert Road - North and South of the Superstition Freeway, Elliot Road to Brown Road
Chandler Boulevard - approaching I-10, East bound & West bound
Southern Avenue - from Rural Road to Country Club Avenue
Power Road - North and South of the Superstition Freeway
Baseline Road - from I-10 to Kyrene Road
Country Club Road - from University Avenue to Guadalupe Road
Rural Road - North and South of the Superstition Freeway (Warner Road to Bell Road)
McKellips Road – from Alma School Road to Gilbert Road
Superstition Freeway – I-10 to Val Vista

Tucson Region

Oracle Road - from 1st Avenue to Ina Road
Oracle Road - from Orange Grove to River Road
I-10 - from Tangerine Road to I-19
I-19 - from Valencia Road to I-10
Grant Road - from Oracle Road to Tanque Verde Road
Speedway Boulevard - from Swan Road to Stone Avenue
River Road - from Craycroft Road to Oracle Road
22nd Street - from I-10 to Alvernon Way
Sunrise Drive - from Craycroft Road to Campbell Avenue
Kolb Road - from River Road to Grant Road
Campbell Avenue - from Grant Avenue to River Road

Tucson Region Cont'd
La Cholla Boulevard - from River Road to Orange Grove Road
Wilmot Road - from 22nd Street to Tanque Verde Road
Houghton Road at Valencia Road
Sabino Canyon - Tanque Verde to Kolb Road
Cortaro Road - La Cholla Boulevard to Silverbell
Valencia Road - Mission Road to Kolb Road
Broadway Boulevard – Barraza Aviation Parkway to Camino Seco

Southeastern Arizona Region
SR 92 - Junction SR 90 to Carr Canyon
US 191 - Swift Trail to Fairgrounds
A Avenue/10th Street - City of Douglas
20th Avenue: Discovery Park Boulevard to US 70 - City of Safford/Town of Thatcher
Fry Boulevard - City of Sierra Vista

Yuma Region
Business 8 - 8th Street - 4th Avenue Exit
US95 - 32nd St - Pacific Avenue
SR280
Arizona Avenue
Avenue A

Prescott Region
SR69 - from Prescott through Prescott Valley
SR89 - Prescott to Chino Valley
SR260 - I-17 to Cottonwood
SR87 - Payson to Strawberry
I-17 - New River to Cordes Junction

Flagstaff - Central Arizona Region
US 89 - North of Flagstaff
I-40 - Flagstaff
SR 179 - I-17 to Sedona
San Francisco Street - Flagstaff
Cedar Avenue - Flagstaff
Milton Road - Flagstaff
I-17 North Bound - Flagstaff
SR 64 -Flagstaff

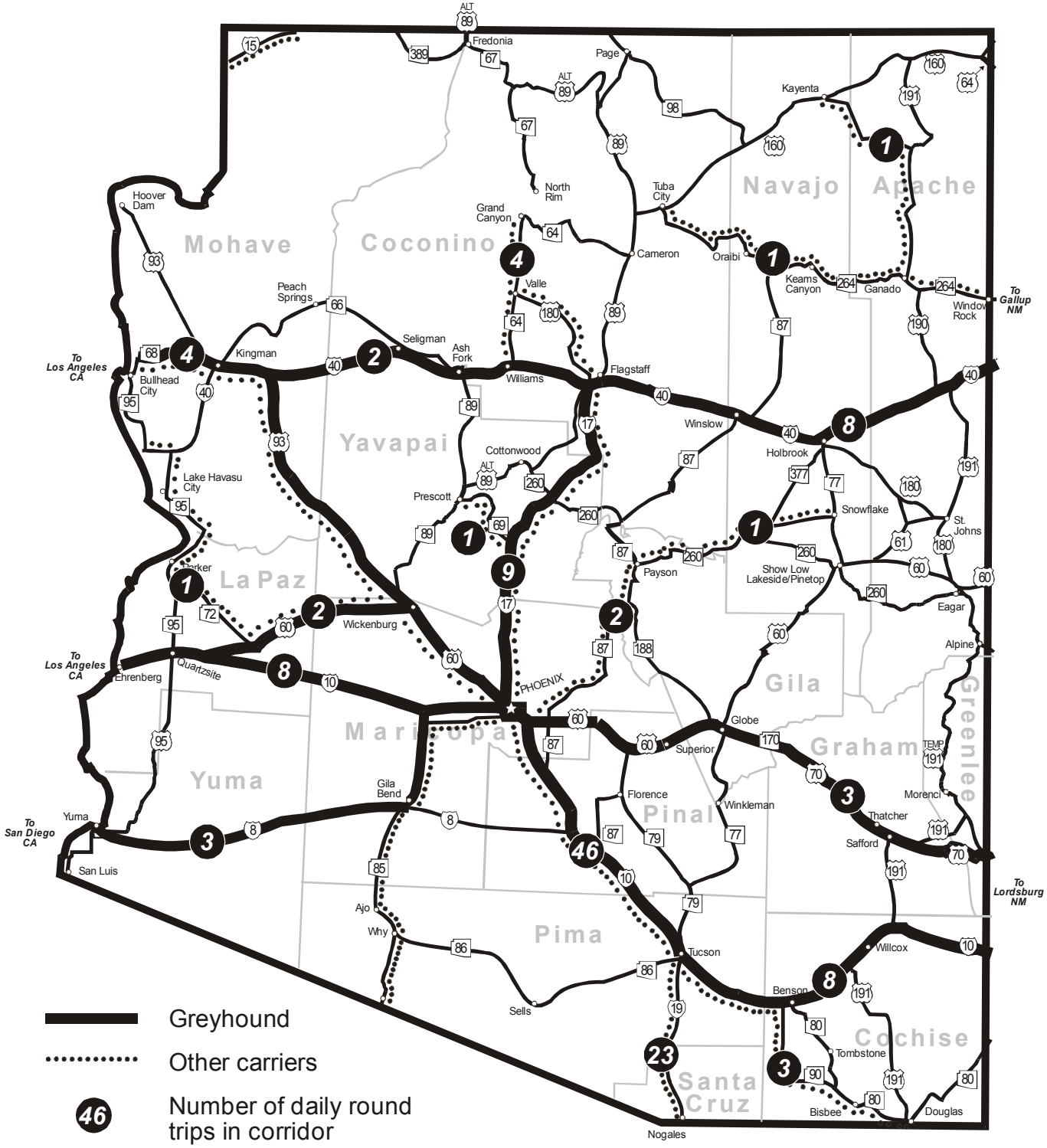
Kingman - Western Arizona Region
US 93 - North of Kingman up to Coyote pass on US 93
US 93 - at Hoover Dam (in Bureau of Reclamation area)
SR 95 - Bullhead City
Stockton Hill Road - Kingman
SR 95 - Laughlin Bridge to Nevada

Northeastern Arizona Region
US 60 - through Globe/Miami
SR 260 - Show Low / Pinetop-Lakeside
Burnside Junction - Window Rock, SR 264
Black Mesa - Kayenta, US 160
Fort Defiance - Navajo, N 12
Berry Street and North Park Drive - Winslow
Chinle - Canyon De Chelly - East, N 7
Lupton Traffic Interchange (TI) at I-40

Source: Arizona Department of Transportation
District Engineer's Office

Exhibit F

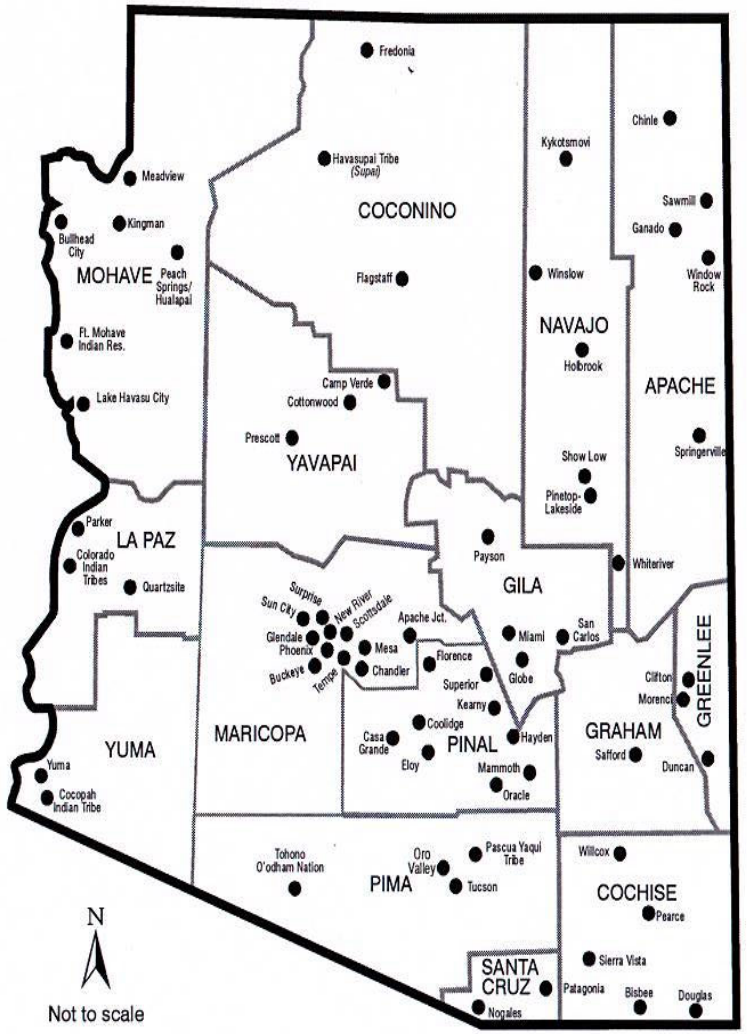
Arizona Intercity Bus Corridors



ADOT: 1997 Transit Plan

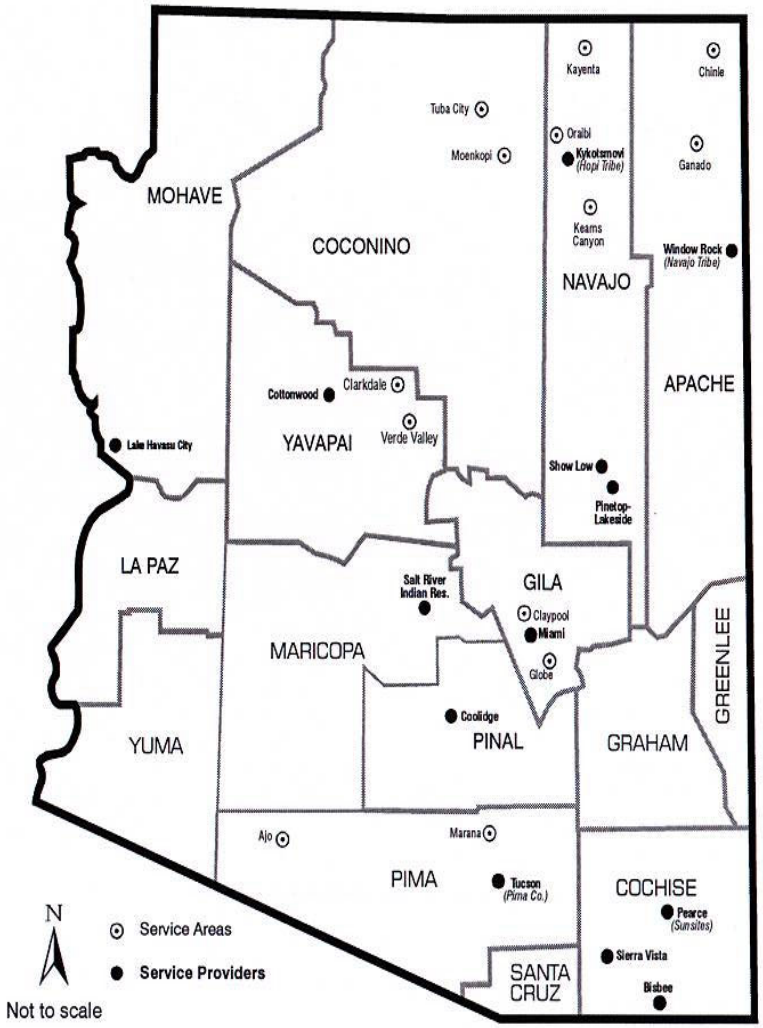
ELDERLY AND PERSONS WITH DISABILITIES TRANSPORTATION PROGRAM FTA SECTION 5310

SERVICE LOCATIONS 2000



RURAL PUBLIC TRANSPORTATION PROGRAM FTA SECTION 5311

SERVICE LOCATIONS 2000



Source: Arizona Department of Transportation, Transit Team

Exhibit G

Exhibit H

SFY 2000 HB 2565 Local Fund Distributions

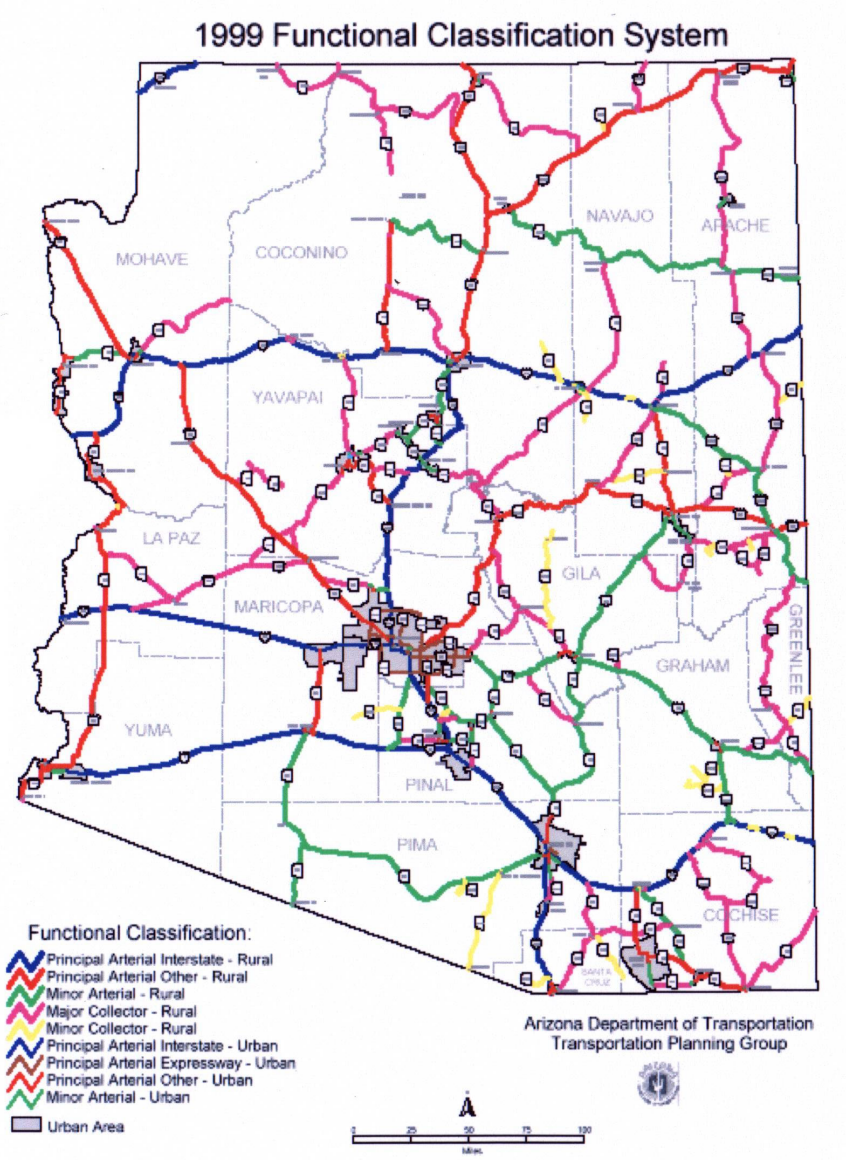
Apache County Total	$250,691
Eagar	$18,287
Springerville	$7,878
St. Johns	$13,356
County	$211,170
Cochise County Total	$467,567
Benson	$17,154
Bisbee	$24,654
Douglas	$57,241
Huachaca City	$7,689
Sierra Vista	$151,114
Tombstone	$6,253
Wilcox	$13,866
County	$189,596
Coconino County Total	$459,538
Flagstaff	$226,491
Fredonia	$5,195
Page	$34,950
Williams	$10,579
Sedona (see Yavapai)	$10,009
County	$172,314
Gila County Total	$185,799
Globe	$30,302
Hayden	$3,438
Miami	$7,727
Payson	$48,287
Winkelman	$1,663
County	$94,382
Graham County Total	$131,108
Pima	$8,218
Safford	$35,762
Thatcher	$16,643
County	$70,485
Greenlee County Total	$34,477
Clifton	$11,428
Duncan	$2,928
County	$20,120
La Paz County Total	$71,788
Parker	$11,297
Quartzite	$8,898
County	$51,593
Maricopa County Total	$10,602,337
Avondale	$108,249
Buckeye	$19,024
Carefree	$9,880
Cave Creek	$13,621
Chandler[1]	$605,154
El Mirage	$22,122
Fountain Hills	$65,289
Gila Bend	$6,574
Gilbert[1]	$344,923
Glendale[1]	$743,649
Goodyear	$54,049
Guadalupe	$20,365
Litchfield Park	$14,622
Mesa[1]	$1,367,354
Paradise Valley	$50,308
Peoria[1]	$339,784
Phoenix[1]	$4,612,230
Queen Creek	$13,016
Scottsdale[1]	$738,642
Surprise	$71,146
Maricopa County (continued)	
Tempe[1]	$601,584
Tolleson	$17,664
Wickenburg	$18,853
Youngtown	$10,504
Apache Junction (see Pinal)[2]	$567
County[1]	$733,164
Mohave County Total	$523,769
Bullhead City	$107,814
Colorado City	$15,472
Kingman	$72,638
Lake Havasu City	$149,829
County	$178,016
Navajo County Total	$349,494
Holbrook	$21,329
Pinetop-Lakeside	$13,167
Show Low	$29,754
Snowflake	$17,399
Taylor	$10,730
Winslow	$42,374
County	$214,741
Pima County Total	$3,112,957
Marana	$37,651
Oro Valley	$96,177
Sahuarita	$11,127
South Tucson	$21,555
Tucson	$1,770,218
County	$1,176,229
Pinal County Total	$595,746
Apache Junction (see Maricopa)	$86,353
Casa Grande	$84,408
Coolidge	$27,355
Eloy	$38,690
Florence	$52,311
Kearny	$9,559
Mammoth	$7,557
Superior	$13,167
County	$276,346
Santa Cruz County Total	$142,820
Nogales	$80,119
Patagonia	$3,589
County	$59,112
Yavapai County Total	$561,081
Camp Verde	$31,814
Chino Valley	$27,261
Clarkdale	$11,089
Cottonwood	$29,376
Jerome	$2,191
Prescott	$130,768
Prescott Valley	$77,323
Sedona (see Coconino)	$27,548
County	$223,711
Yuma County Total	$510,829
San Luis	$41,902
Somerton	$25,031
Wellton	$4,931
Yuma	$257,530
County	$181,435
Total City & Town Governments	$14,147,585
Total County Governments	$3,852,414
TOTAL	$18,000,000

[1] Required 100% transit use.

[2] Maricopa % of distribution administered by or within CAAG region.

The above VLT estimate includes $6.8 million in Powerball monies, $1.6 million from FY 1999 VLT positive variance over estimate, and the original FY 2000 VLT estimate of $9.6 million.

Source: Arizona Department of Transportation



Definitions of Classes

- **Class 1: 2,460 miles**
  Goal: >90% Good, <5% Poor
  - Principal Arterial Interstate – Rural
  - Principal Arterial Interstate – Urban
  - Principal Arterial Expressway – Urban
- **Class 2: 1,150 miles**
  Goal: >70% Good, <20% Poor
  - Principal Arterial Other – Rural
  - Principal Arterial Other – Urban
- **Class 3: 1,270 miles**
  Goal: >70% Good, <20% Poor
  - Minor Arterial – Rural
  - Minor Arterial – Urban
- **Class 4: 2,140 miles**
  Goal: >70% Good, <20% Poor
  - Major Collector – Rural
  - Minor Collector – Rural
  - Collector – Urban

Source: Arizona Department of Transportation

Exhibit I

Exhibit J

STRATEGIES TO REDUCE CONGESTION AND IMPROVE CAPACITY

Many of the following strategies are applicable to urban areas throughout the state. Most of these initiatives are relatively low-cost and should be implemented by the various jurisdictions utilizing existing revenue sources.

Incident Management Strategies

- **Install cameras to provide better road condition information.** ADOT has installed video cameras on heavily congested portions of the Phoenix Freeway System. These cameras are used to observe roadway conditions and to provide assistance during incidents. There is a need to provide camera coverage at critical locations in other parts of the state, primarily in high crash locations, heavily congested areas, and locations where adverse weather conditions are first detected. So far, 73 locations have been identified.

- **Establish a formal freeway service patrol program along I-10, I-19 and the parkways throughout the Tucson region.** Currently, ADOT and MAG jointly support a formal DPS service patrol program that serves the Valley freeway system. The cost to expand this program to the Tucson region is estimated to be $450,000 (start-up costs and two-years of operation). Based on the experience in other metropolitan areas, freeway service patrols have proven to be a very cost-effective method for reducing congestion, vehicle emissions and the incidence of secondary collisions.

Traffic Management Enhancements

- **ADOT traffic lights should be transferred to an appropriate county or municipality.** ADOT has adopted a policy of turning over the operation and maintenance of it's traffic signals to an appropriate county or municipality traffic operation center once a compatible traffic control computer board has been installed in at the signal.

- **Turn off or limit "green time" on traffic lights that are less than ½ mile apart on the one-mile major arterial streets in the Phoenix and Tucson regions.** Limiting irregular traffic light locations will facilitate improved traffic signal timing and increase the effective carrying capacity of key urban streets.

- **Link all Phoenix area traffic lights into the appropriate traffic operation center (TOC).** Linking all lights to a TOC would enable traffic engineers to adjust traffic light signals from a central computer rather than manually adjusting a signal's time in the field.

- **Complete the Arterial Traffic Management System (ATMS).** Tucson and Pima County have ambitious programs to manage arterial traffic flow through the application of improved signal coordination through the application of both traffic actuated timing and traffic adaptive timing algorithms with advanced video detection technology. According to Pima Association of Governments and Tucson traffic engineers, the following are some critical "no-cost" elements of the program to get "more green" out of signal operations:

  Wider roadways should be designed to accommodate a pedestrian safe haven in the center of the roadway reducing total intersection delay and associated accidents;

  Arrow signal MUST be designed to allow traffic to turn also during the normal green. LEFT ON GREEN ARROW ONLY signal restrictions must be avoided;

  The spacing between signals along urban arterials must be at ½ mile intervals to allow for optimum progression of traffic in all directions. Irregularly spaced signals create extra stops, congestion and associated accidents; and

  Legislate liability protection for governmental agencies that change signal operations to the more efficient techniques or removal of unwarranted signals.

- **Expand the AZTech Regional Traffic Management System in Maricopa County.** The proposal is to include 15 additional sites. This should enhance the sharing of real time traffic data between jurisdiction. The AZTech system consists of an interconnected traffic management system. Currently, there are 13 Traffic Management Work Stations at 13 locations across the region. This project will provide ten additional AZTech Work Stations to provide the interconnection to additional cities and towns and enable seamless traffic management.

- **Accelerate the expansion of AZTech Smart Corridors in the Maricopa County Region.** These efficient arterial corridors will not only provide relief to the freeway system by encouraging drivers making short-trips to keep away from the freeway system and also help in reducing the overall impact of freeway incidents. A "smart" corridor consists of traffic signals linked to a traffic operation center, VMS boards, and loop detectors or cameras to identify "real time" traffic conditions or incidences. The next group of Phoenix area streets to be configured as smart corridors includes Camelback Rd., Power Rd., Gilbert Rd., 99th Ave., McKellips, Main St. in Mesa, and Rio Salado Parkway.

- **Implement a pilot project that would provide real time information to passengers on the expected arrival time of buses in both the Phoenix and Tucson metropolitan areas.** This proposal will enhance real-time information to urban transit customers regarding transit schedules and on-time status.

- **Partial Freeway Management for Interstate 17, US 60, Loop 101, and Loop 202.** A total of 109 miles of Maricopa Regional Freeway system do not have any ITS infrastructure. This program would include the installation of conduit and fiber optics, installing cameras and detection devices for incidents. Existing traffic signals and ramp meters would also be connected into the system. New variable message signs would be installed at critical decision points.

Capacity Enhancement Strategies

- **Re-prioritize existing federal, regional or local monies to expand the Phoenix area vanpool program.** Currently, there are 204 vans in operation in the Phoenix area. Fares cover 100% of operating costs and even help pay for some capital costs. The Regional Public Transportation Authority estimates that there is a need for 500 to 1,000 more vans in the Maricopa Region. Vanpools are operating in the Tucson region and in Pinal County, but there is no data, at this time, on the vanpool needs for these two regions.

- **Expedite the construction of bus pullout lanes, especially on major arterial streets (one-mile grid system).** Bus pullout lanes facilitate the smooth flow of traffic and improve safety on major arterial streets used by local buses. The Phoenix transit tax provides funding 500 additional bus pullout lanes. The Tempe transit tax also provides some funding for bus pullout lanes. The cost to construct a single pullout lane is approximately $55,000.

Transportation Safety Enhancements

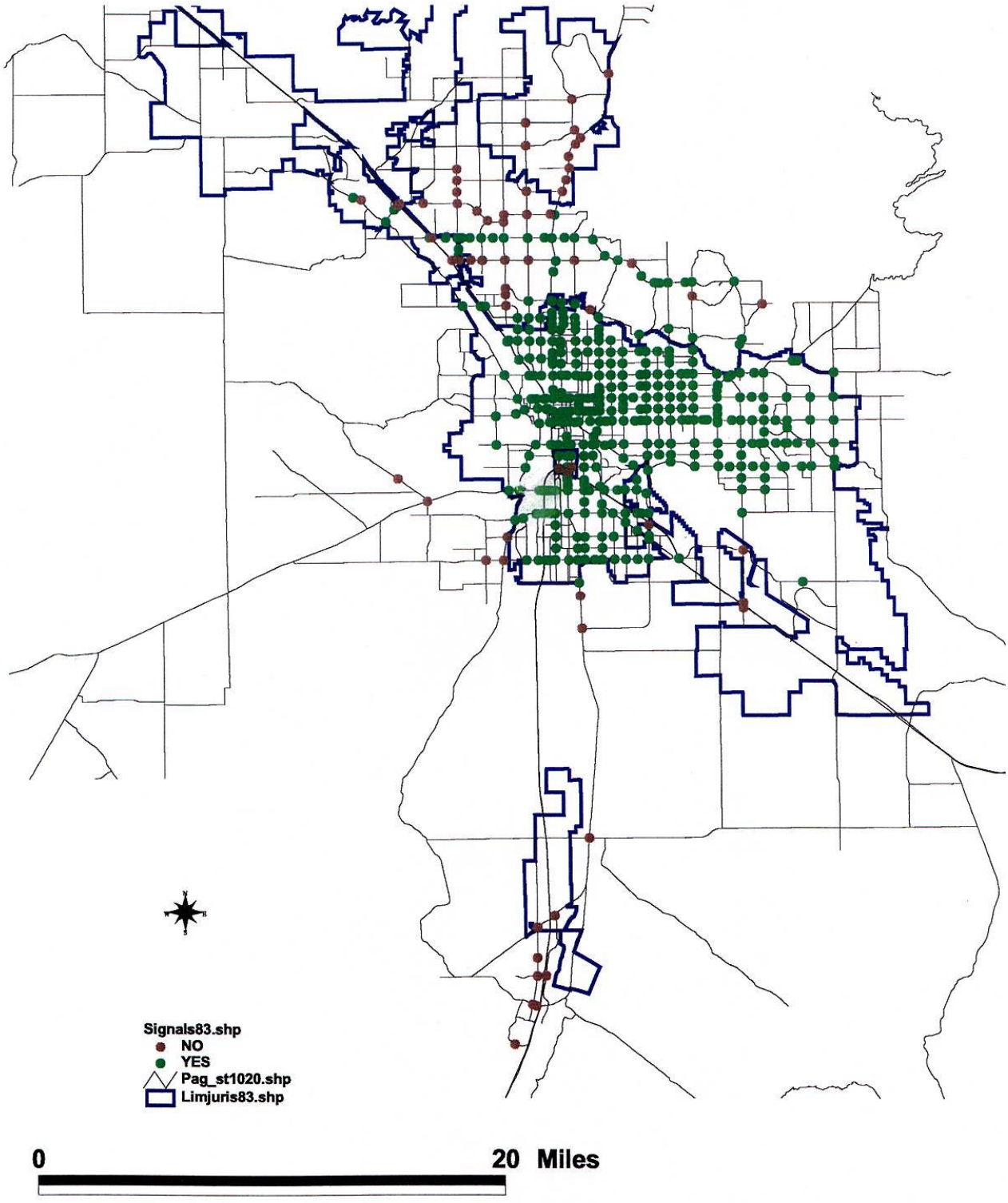
- **Conduct a pilot project for improving railroad crossings.** Railroad-highway crossings create congestion problems that affect traffic performance. Often during peak commuter hours when a train blocks the progress of exiting traffic, vehicles are stopped on the freeway when the exit ramp capacity is exceeded. The pilot project should improve site safety, reduce congestion, and enhance the Traffic Management System at the site. Detectors should monitor train length and speed dynamics far in advance of normal crossing warning sensors. This data will allow predictive modeling of train arrivals and crossing duration. Very early warning of an arriving train will allow the traffic signal controller to optimize traffic movements and the stacking capacity of the streets.

- **Expand funding for the Commercial Vehicle Information Network and System (CVISN) Project.** Arizona is currently completing Phase 1 of this federally funded project, which involves electronic clearance of commercial vehicles at ports-of-entry, improved administrative processes, and improved safety inspection and records for the Department of Public Safety. The CVISN should be expanded to enhance the ability of DPS and MVD to provide "real time" information throughout the state regarding commercial vehicles that have failed a safety inspection.

Source: Vision 21 Staff

Exhibit K

Traffic Signal Coordination – Pima County



Source: Pima Association of Governments

Table 4-1
HOV Corridor Cost Effectiveness Evaluation Details for 2020
(basis for ranking of newly recommended HOV lanes)

Corridor	Segment	Rank	Cost Effectivenes		HOV Volume		Person Trip Throughput		Speed		Time Savings	Segment Length
			Total Cost (millions)	Value $/hr saved	AM Peak	PM Peak	AM Peak	PM Peak	HOV Lane	Regular Lane	(hours per mile)	(miles)
SR-101 Pima	FL Wright to SR-202	A	$50.61	$1.82	1348	1623	2831	3407	50	19	0.0339	14.2
I-10 Papago	79th Ave to 3rd Ave	B	$64.87	$3.25	1803	2347	3786	4928	58	23	0.0295	8.4
SR-101 Price	SR-202 (RM) to US-60	B	$12.51	$4.76	851	1224	1787	2571	56	27.5	0.0185	3.5
SR-101 Price	US-60 to Chandler Rd	C	$20.30	$8.97	500	723	1049	1518	60	30	0.0167	5.7
SR-101 Pima	SR-51 to FL Wright	C	$23.83	$9.73	630	832	1323	1747	62	35	0.0129	6.7
with SR-51 / SR-101 HOV connectors												
I-10 Papago	Agua Fria River to SR-101	D	$13.42	$10.45	830	1262	1742	2651	59.5	39	0.0088	3.6
I-17 Black Canyon	I-10 (Pap) to I-10 (Mar)	D	$64.56	$12.21	978	1456	2054	3058	55.5	28.5	0.0171	6.5
with I-10 / I-17 HOV connectors												
and with Washington/Jefferson HOV direct access												
SR-101 Pima	I-17 to SR-51	D	$24.42	$12.48	497	653	1044	1370	60	34	0.0127	6.8
I-17 Black Canyon	SR-74 to SR-101	D	$32.16	$14.08	595	770	1249	1617	62	39	0.0095	9.0
I-17 Black Canyon	Desert Hills to SR-74	D	$14.29	$14.26	385	476	808	999	63	32.5	0.0149	4.0
SR-101 Price	Chandler to SR-202 (San)	E	$3.77	$20.97	222	301	467	632	60	30	0.0167	1.1
SR-202 Red Mountain	SR-101 to SR-87	E	$12.76	$24.66	273	558	574	1171	61	40	0.0089	3.6
SR-101 Agua Fria	I-17 to 67th Ave	E	$19.15	$24.32	439	537	922	1127	61	42	0.0077	5.4
I-10 Papago	SR-85 to Agua Fria River	E	$59.50	$27.04	331	510	695	1071	62	41	0.0084	16.0
SR-101 Agua Fria	US-60 (Grand) to I-10	E	$34.54	$31.42	502	609	1053	1279	60	46	0.0052	9.7
SR-101 Agua Fria	67th Ave to US-60 (Grand)	E	$37.07	$76.05	247	335	519	703	60	48	0.0041	10.4
SR-202 Santan	I-10 to SR-101 (Price)	E	$16.72	$193.22	146	252	306	529	60	53	0.0024	4.7
SR-202 Santan	SR-101 (Price) to US-60	E	$66.46	$196.56	116	166	245	348	61	52	0.0033	18.6
SR-202 Red Mountain	SR-87 to SR-60	E	$61.68	$255.21	102	188	215	394	61	54	0.0025	17.3
SR-202 South Mountain	I-10 (Pap) to I-10 (Mar)	E	$74.32	$465.07	1000	1300	2100	2730	62	61	0.0002	20.8
I-10 Maricopa	SR-202 (San) to Riggs Rd	E	$20.58	$15,098.82	27	43	57	90	65	64.3	0.0002	5.8

Source: Arizona Department of Transportation

Exhibit L

Figure Express Bus and Bus Rapid Transit Plan

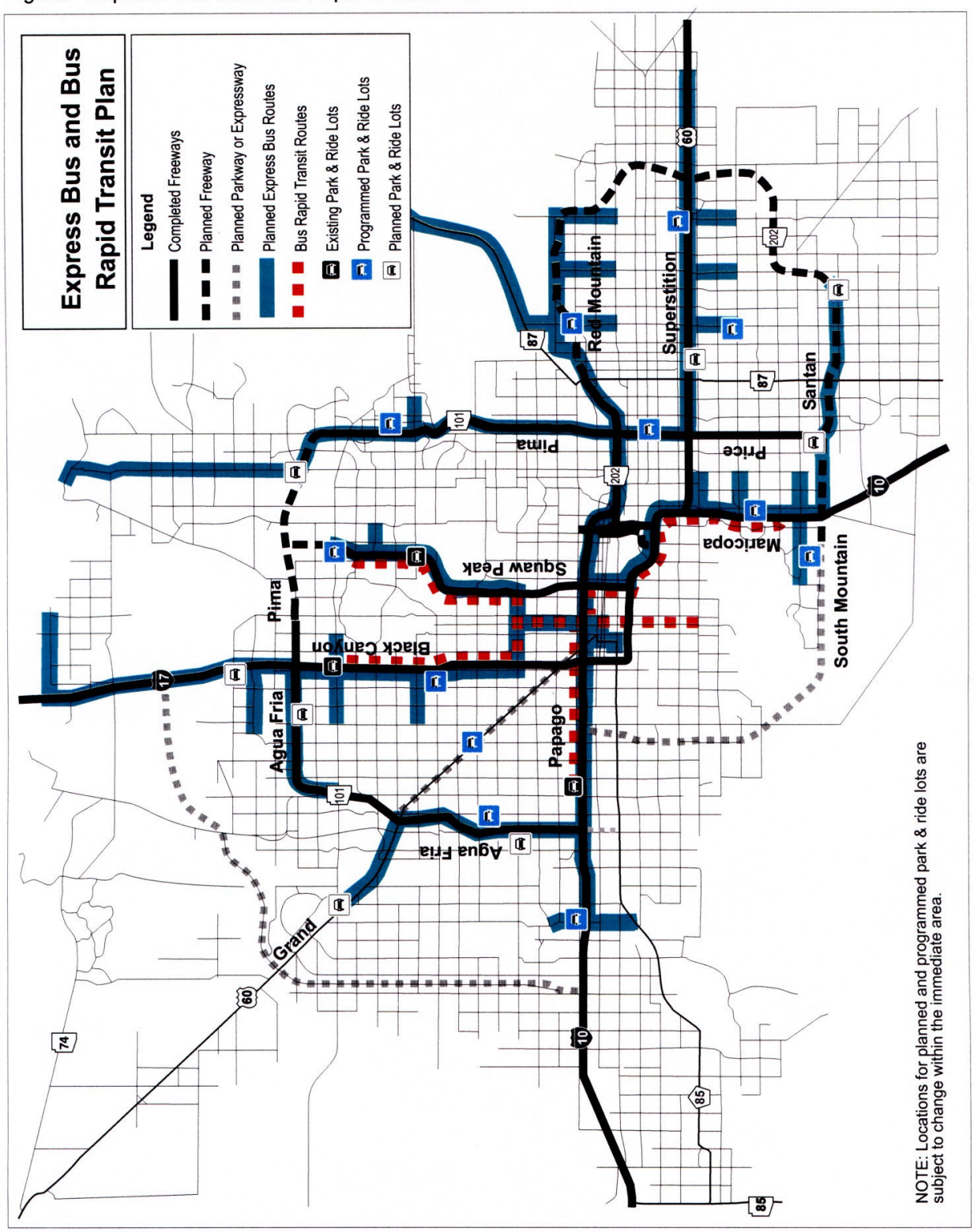


Exhibit M

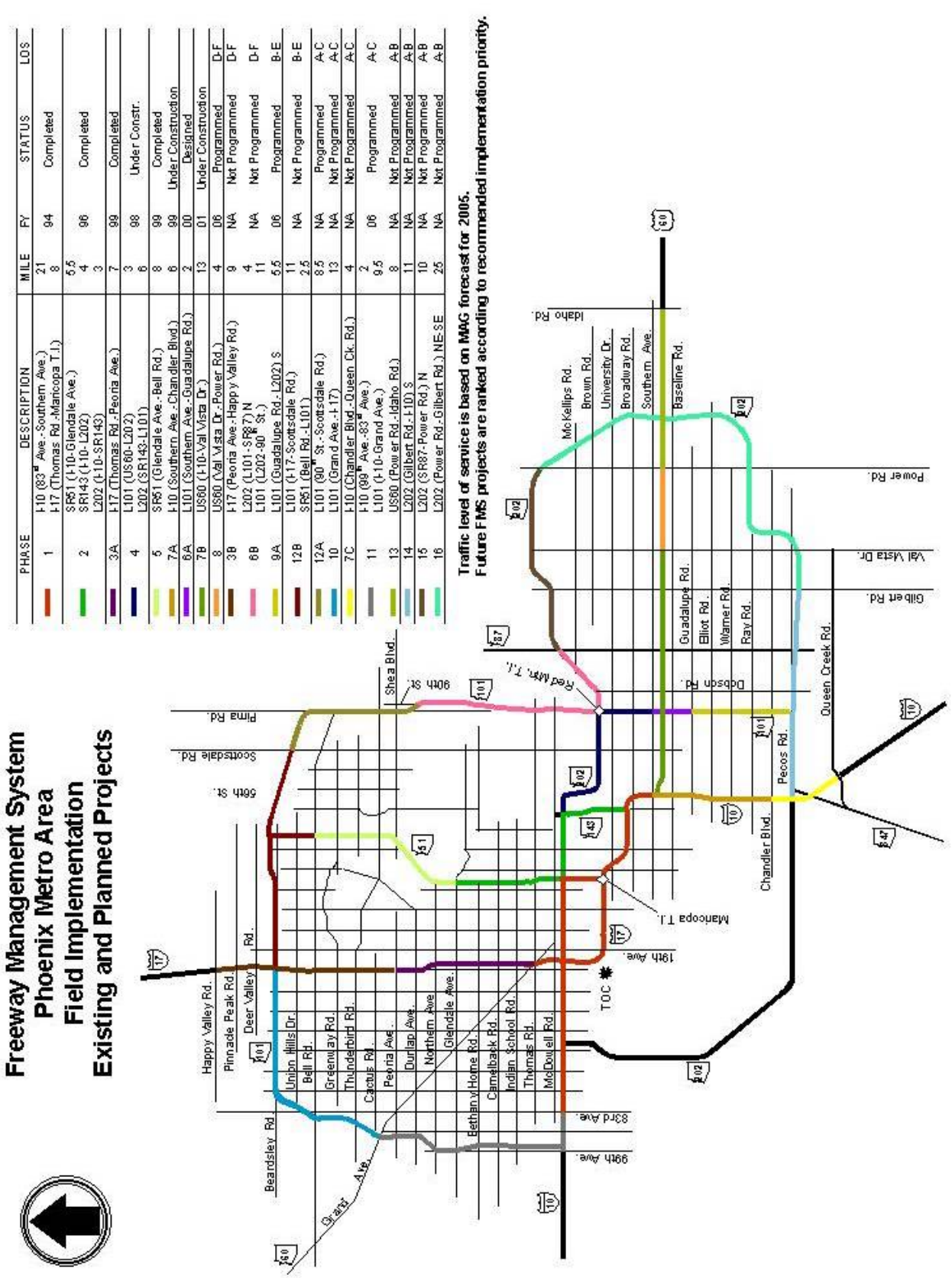
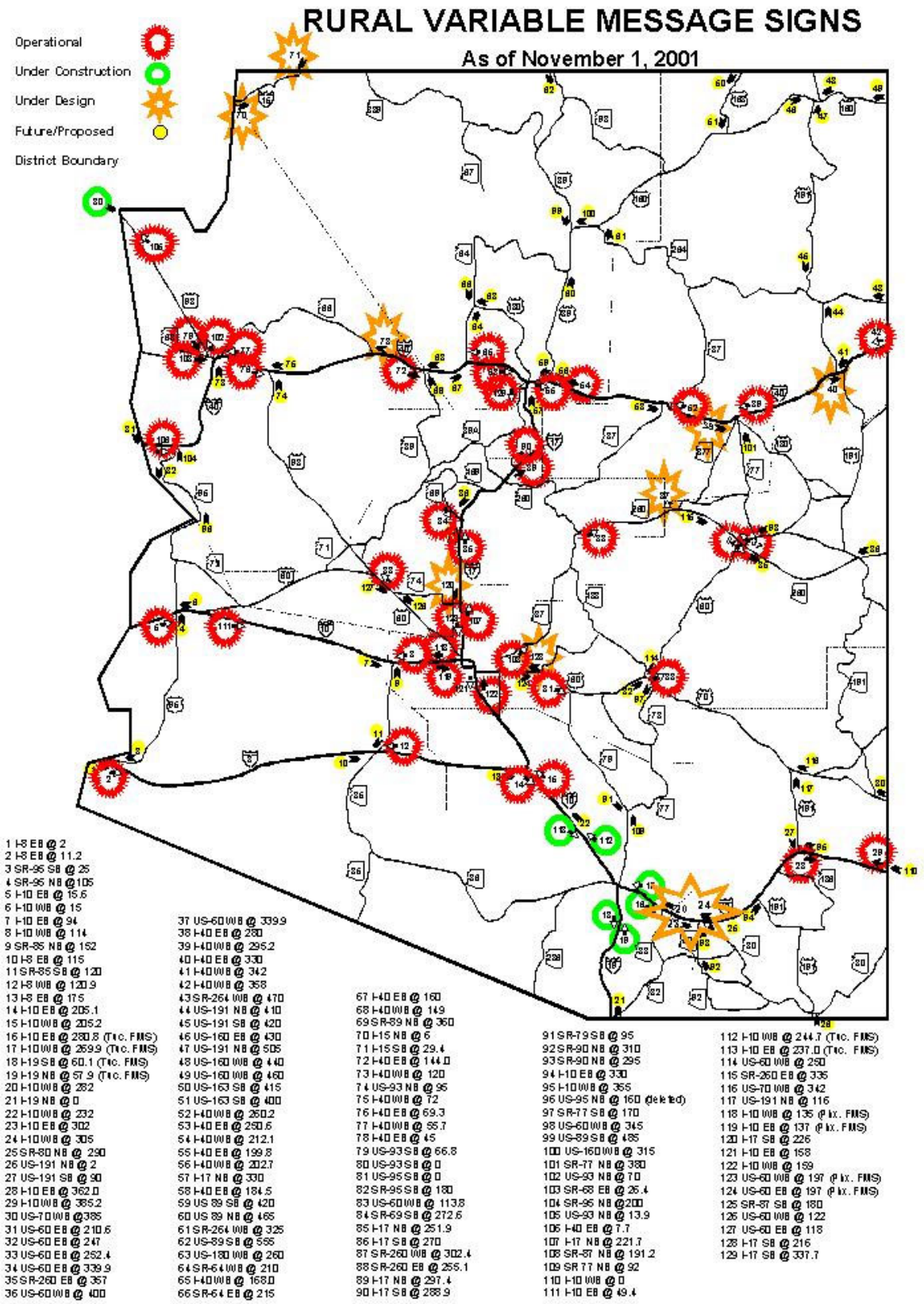

Freeway Management System
Phoenix Metro Area
Field Implementation
Existing and Planned Projects
Traffic level of service is based on MAG forecast for 2005.
Future FMS projects are ranked according to recommended implementation priority.
PHASE
DESCRIPTION
MILE
FY
STATUS
LOS
1
I-10 (83rd Ave.-Southern Ave.)
21
94
Completed
A-C
I-17 (Thomas Rd.-Maricopa T.I.)
8
2
SR51 (I-10-Glendale Ave.)
5.5
Completed
A-C
SR143 (I-10-L202)
4
96
L202 (I-10-SR143)
3
3A
I-17 (Thomas Rd.-Peoria Ave.)
7
99
Completed
D-F
4
L101 (US60-L202)
3
98
Under Constr.
A-C
L202 (SR143-L101)
6
5
SR51 (Glendale Ave.-Bell Rd.)
8
99
Completed
A-C
7A
I-10 (Southern Ave.-Chandler Blvd.)
6
99
Under Construction
A-C
6A
L101 (Southern Ave.-Guadalupe Rd.)
2
00
Designed
A-C
7B
US60 (I-10-Val Vista Dr.)
13
01
Under Construction
A-C
8
US60 (Val Vista Dr.-Power Rd.)
4
06
Programmed
D-F
3B
I-17 (Peoria Ave.-Happy Valley Rd.)
9
NA
Not Programmed
D-F
L202 (L101-SR87) N
4
NA
Not Programmed
D-F
6B
L101 (L202-90th St.)
11
NA
Not Programmed
D-F
9A
L101 (Guadalupe Rd.-L202) S
5.5
06
Programmed
B-E
12B
L101 (I-17-Scottsdale Rd.)
11
NA
Not Programmed
B-E
SR51 (Bell Rd.-L101)
2.5
12A
L101 (90th St.-Scottsdale Rd.)
8.5
NA
Programmed
A-C
10
L101 (Grand Ave.-I-17)
13
NA
Not Programmed
A-C
7C
I-10 (Chandler Blvd.-Queen Ck. Rd.)
4
NA
Not Programmed
A-C
11
I-10 (99th Ave.-83rd Ave.)
2
06
Programmed
A-C
L101 (I-10-Grand Ave.)
9.5
13
US60 (Power Rd.-Idaho Rd.)
8
NA
Not Programmed
A-B
14
L202 (Gilbert Rd.-I-10) S
11
NA
Not Programmed
A-B
15
L202 (SR87-Power Rd.) N
10
NA
Not Programmed
A-B
16
L202 (Power Rd.-Gilbert Rd.) NE-SE
25
NA
Not Programmed
A-B
Happy Valley Rd.
Pinnacle Peak Rd.
Deer Valley Rd.
Union Hills Dr.
Bell Rd.
Greenway Rd.
Thunderbird Rd.
Cactus Rd.
Peoria Ave.
Dunlap Ave.
Northern Ave.
Glendale Ave.
Bethany Home Rd.
Camelback Rd.
Indian School Rd.
Thomas Rd.
McDowell Rd.
Beardsley Rd.
Grand Ave.
Shea Blvd.
90th St.
Scottsdale Rd.
Pima Rd.
66th St.
Red Mtn. T.I.
Mcdowell Rd.
McKellips Rd.
Brown Rd.
University Dr.
Broadway Rd.
Southern Ave.
Baseline Rd.
Idaho Rd.
Power Rd.
Val Vista Dr.
Gilbert Rd.
Guadalupe Rd.
Elliot Rd.
Warner Rd.
Ray Rd.
Dobson Rd.
Queen Creek Rd.
Pecos Rd.
Chandler Blvd.
Mahoopa T.I.
19th Ave.
TOC
83rd Ave.
99th Ave.
5/1/01 MA
Source: Arizona Department of Transportation

Exhibit N



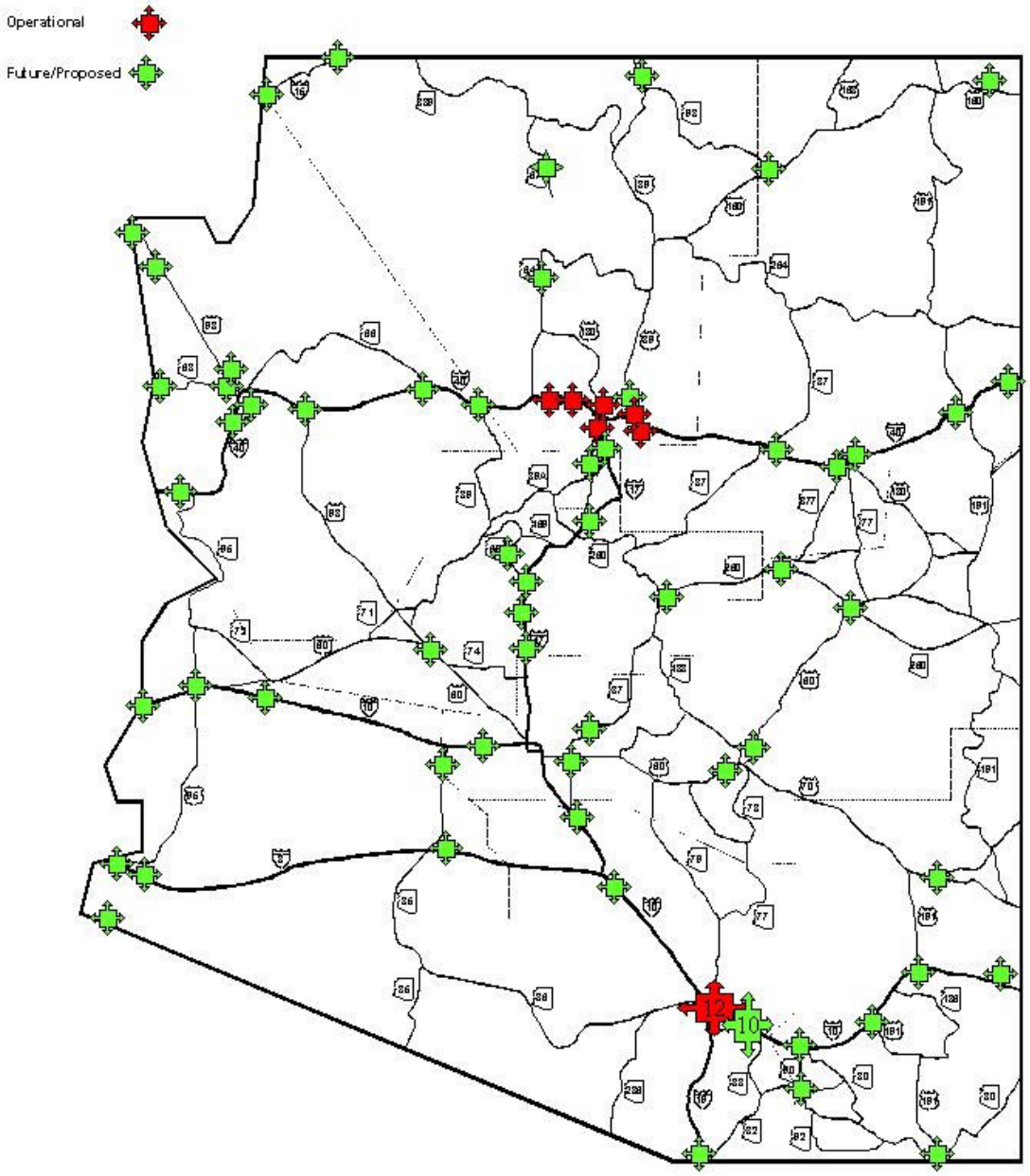
Source: Arizona Department of Transportation

Exhibit O

Rural Cameras

As of November 1, 2001

(Excluding Phoenix)



Source: Arizona Department of Transportation

Exhibit P

Table ES-1 — Adopted Design Concept Guidelines
for Roads of Regional Significance

	Urban Roads of Regional Significance	Gateway Roads of Regional Significance
Number of Lanes	Six lanes ultimate.	Four lanes.
Right-of-Way	140 feet (adopted 4/29/91)	140 feet
Lane Separation	Divided with breaks restricted to four per mile.	Divided with breaks restricted to two per mile.
Lane Width	12 feet	12 feet
Left Turn Lanes	At all locations where left turns are permitted.	At all locations where left turns are permitted.
Right Turn Lanes	At all locations where right turns are permitted and volumes warrant.	At all locations where right turns are permitted and volumes warrant.
Access	Eight per mile.	Two per mile.
Traffic Signal	Fully coordinated and progressed; restricted to mile and half-mile locations.	Full coordinated and progressed; restricted to mile and half-mile locations.
Posted Speed	40 mph	55 mph, except in built-up areas.
Parking	Prohibited.	Prohibited.
Transit	Provide for pullouts and queue hoppers where appropriate.	Provide for pullouts and queue hoppers where appropriate.
Signing	Uniform upgraded signing.	Uniform upgraded signing.
Bicycle Facilities	Bicycle facilities to conform with Arizona Bicycle Facilities Planning and Design Guidelines.	Bicycle facilities to conform with Arizona Bicycle Facilities Planning and Design Guidelines.
Mitigation	Buffering, landscaping and pedestrian paths as warranted.	Buffering, landscaping and pedestrian paths as warranted.

Source: Maricopa Association of Governments

CLIMBING / PASSING LANE PROJECTS – FY 99-01

FY99

TRACS	ROUTE	BMP	LENGTH	PROJECT LOCATION	TYPE OF PROJECT	BUDGET
H4610	60	322.4	1.2 Miles	Climbing Lane, MP 322.0 - 323.2 EB	Construct Climbing Lane	$600,000
H4323	77	372.0	1.5 Miles	14 Mile Hill	Construct Climbing Lane, SB	$733,000
H3225	85	120.6	2.9 Miles	Gila Bend - MC 85 Phase I	Construct Passing & Turn Lanes	$1,850,000
H3225	85	121.0	4.5 Miles	Intermediate Improvement Gila Bend Phase II	Construct Passing & Turn Lanes	$2,768,000
H3708	89	327.9	0.9 Miles	Prescott - Chino Valley, NB	Widen Existing Roadway 12' From Edge of Pavement	$790,000
H4308	93	108.7	1.5 Miles	Cane Springs Passing Lanes	Construct Climbing Lanes	$500,000
H4306	93	172.6	2.9 Miles	Climbing Lanes, MP173.8 - MP172.6 NB, MP 174.3 - MP 176.0 SB	Construct Climbing Lanes	$1,330,000
H4299	95	73.1	2.1 Miles	Climbing Lane, MP 73.1 - MP 75.2, NB	Construct NB Climbing Lane	$967,000
H4316	260	290.5	2.0 Miles	MP 290.5 - MP 291.5 EB, MP 291.0 - MP 292.0 WB	Construct Climbing & Turn Lanes	$1,100,000
H4315	260	295.0	2.4 Miles	MP 295.0 - MP 296.0 EB, MP 296.4 - MP 297.8 WB	Construct Climbing Lanes	$1,177,000

FY00

TRACS	ROUTE	BMP	LENGTH	PROJECT LOCATION	TYPE OF PROJECT	BUDGET
H4682	60	302.3	2.3 Miles	Climbing Lanes, MP 302.3 - 313.3 EB & WB	Construct Climbing Lanes EB & WB	$2,880,000
H4094	77	162.6	0.8 Miles	SB Climbing Lane, MP 162.6 - MP 163.4	Construct Climbing Lane	$1,751,000
H4841	89	464.0	2.9 Miles	Cameron - Bitter Springs	Passing Lane Improvements SB 464.0 - 465.3, NB 467.5 - 468.5, SB 479.6 – 480.2	$1,708,000
H4842	89	539.0	3.3 Miles	Bitter Springs - Utah State Line	Passing Lanes, SB 538.5 - 540.3, 544.7-546.2	$1,279,000
H4955	95	115.7	1.0 Miles	Climbing Lane, MP 115.7	Construct Climbing Lane	$1,000,000*
H5401	260	298.0	2.8 Miles	MP 298.0 - MP 299.6 EB, MP 301.0 - MP 302.2 WB	Construct Climbing Lane	$1,335,000

* This Climbing Lane project became part of the Bouse Road – North Pavement Preservation Project 95 LA 115.7 H4548 01C.

FY01

TRACS	ROUTE	BMP	LENGTH	PROJECT LOCATION	TYPE OF PROJECT	BUDGET
H4611	60	326.4	2.2 Miles	Climbing Lanes, MP 326.4 - 327.6 WB, MP 329.0 - MP 330.0 EB	Construct Climbing Lanes EB & WB	$1,200,000
H4612	60	334.1	2.6 Miles	Climbing Lanes, MP 334.1 - 336.2 EB, MP 337.8 - MP 338.3 WB	Construct Climbing Lanes EB & WB	$1,330,000

Source: Arizona Department of Transportation

Exhibit Q